AVIATION

The Oldest American Aeronautical Magazine

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Torpedo Squadron Two, Aircraft Squadrons, Battle Fleet, Over San Diego Bay

VOLUME XXV NUMBER 11

Special Features

The "Kari-Keen Coupe"
The Curtiss "Challenger"
Parachutes in Civil and Commercial Aviation

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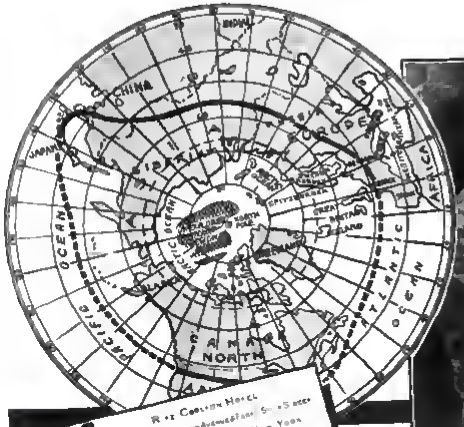

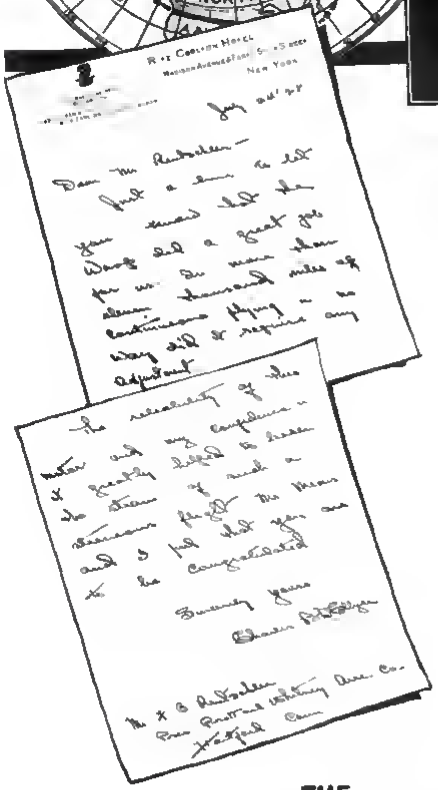

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Vol. XXV *SEPTEMBER 8, 1928* No. 11

Cooperation Desired

BY the time these few lines appear in print the Aeronautics Branch of the Department of Commerce will have completed the mailing out of the blank airway operation questionnaire covering the period of January 1 to June 30 of this year This questionnaire, while not of great length, requests sufficient information, regarding the activities of the individual operator during the six months period, as to require a certain amount of time and care in filling it out. Such being the case, there may be a tendency on the part of some of the operators to procrastinate a little and put off the task until a more "favorable" time.

The Department experienced considerable trouble in securing the filled out questionnaires for the last six months of 1927, and as a result, the publishing of the Department's report covering all airway operations for that period was somewhat delayed It is to be hoped that there will be a minimum of procrastinating this year and that the Department will receive early returns Part of the questionnaire is devoted to confidential information, which, of course, will not be made public as regards the individual operator However, the other part, if properly filled out, will supply information which, when combined with the information supplied by the other questionnaires, will be of considerable interest and value to the entire industry The completed report as published by the Department will enable one to ascertain the progress of airway operation in this country for the first six months of 1928 and, when compared with similar reports published for 1926 and 1927, to ascertain the progress of airway operations in this country from year to year.

Earning Your Way

IN all of our colleges and universities the majority of students earn all or part of their tuition expenses Student employment bureaus are well organized, and even in the small towns, where some of the colleges are located, it has been possible for the student to find a part time job which enables him to earn money and at the same time continue his college course With the present high cost of obtaining the 200 hr. solo which is required for a transport pilot's license some similar arrangement should be made for the benefit of the flying student who intends making flying his profession.

At present most flying schools cater to the cash customer This is, perhaps, all right when all that the student desires is to learn how to solo However, when he desires to obtain the necessary 200 hr. of flying time in order to qualify for a transport pilot's license the matter assumes an entirely different aspect Two hundred hours is a lot of time to spend in the air and, because of bad weather, planes being busy, or out of repair, it usually takes a student six months to get in that amount of time Perhaps that is just as it should be, for flying instruction should be well absorbed, and there is a definite limit to the amount of flying which can be done at one time However, if schools are going to keep students for this length of time it should be perfectly possible, and also good business, to see that they are provided with part time jobs so that they can earn as they learn.

At active flying fields there are quite a number of jobs to be done which do not require any experience Many of the students, however, will have had mechanical training, and under supervision could do repair work or fit into some position in a nearby factory If it should be impossible to provide the student with aeronautical work the school management would do well to actively assist their students in obtaining part time jobs outside of the industry If students are really anxious to learn, and they are willing to work hard and to accept positions which they would ordinarily consider to be beneath their dignity, there is no reason why they should not work their way through a flying course just the same as the student works his way through four years of university training

The Pilot's Status

ONE often hears the assertion that the pilot's status in the industry will soon be reduced to little more than that of an aerial chauffeur. Such an assertion is rather absurd, for with the growth of air transportation there will be an increase in the size and value of the planes which will have to be piloted No company is going to entrust a half-million dollar airplane to anyone except an expert of the highest order, and a man of this type will be well paid for his services. The man who pilots the giant airliners of the future will have to be familiar with radio; he will have to know his engines and his plane; he will have to be an expert on both meteorology and navigation, and he will have to have had a vast amount of flying experience

Most of the time he will not have to use this knowledge, but, like the captain of an ocean liner, he will have to possess the experience and knowledge necessary to meet any emergency that may arise. Ocean liners are now steered by automatic control; they get their bearings by wireless, etc., but the captain has not lost his prestige The pilot who is entrusted with a valuable cargo, an expensive plane and, above all, the lives of passengers will most certainly have to be as high a type of man as our present air mail pilots, and will undoubtedly receive as high or even higher reward.

The Curtiss "Challenger"

New Six Cylinder Radial Aircooled Engine Developing 170 Hp. Is Designed for the Present OX-5 Powered Planes

By Arthur Nutt
Chief Engineer, Curtiss Aeroplane and Motor Co, Inc

IN the Spring of 1927, it was decided to study the design of a small engine of 170 to 180 hp. This size was selected after considering the uses for which the engine would be needed. An engine of this capacity is suitable for commercial planes carrying four or five passengers and for training pilots, either in these same planes or in planes designed for that particular purpose. The Curtiss OX-5 engine of 90 hp. weighs approximately 500 lb. installed. It was planed to bring out an engine, which could be used in the same planes as the OX-5 engine, with a considerable reduction in weight, and 100 per cent more power.

In considering the design of this engine, low cost with quality was the first consideration. Therefore, an engine with the fewest number of cylinders that would operate smoothly was selected. There were several reasons for selecting six cylinders, rather than an odd number. It was considered that seven cylinders were unnecessary, and that a maximum mean effective pressure would not be possible in the induction system with seven cylinders unless a centrifugal blower was used, which would increase the expense and reduce the reliability of the engine. Five cylinders were not selected for the same reason, and also because it was felt that the engine probably would be too rough with these few cylinders.

In the six cylinder two-throw crankshaft radial engine, simple induction manifolding is obtained. Three cylinders on each side of the vertical center line are fed from one barrel of a double carbureter. This carbureter is of the simplest form. It has no mechanical accelerating devices, such as would be necessary if more than three cylinders were being fed from a single barrel. The fact that the cylinders are equally spaced at 60 deg. angles, provides large spaces between the cylinders for visibility and permits the use of the "Crusader" type of cowling, which is very advantageous as far as head resistance and proper cylinder cooling are concerned. This is exemplified in one of the 1927 English Schneider Cup Racers using an air cooled engine. Another consideration for the selection of the number of cylinders was the simple exhaust manifolding. It was possible to manifold three cylinders on each side of the vertical center line in a symmetrical and neat form.

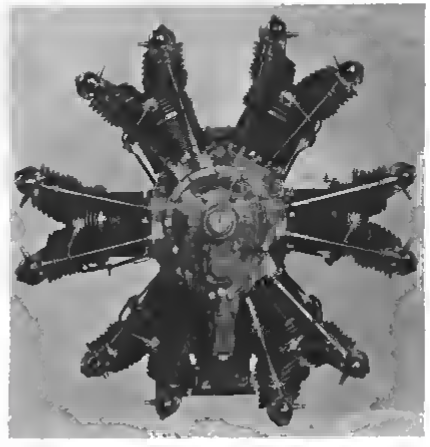
By the use of the two-throw crankshaft, the crankpin loads are divided, permitting the use of a smaller and shorter crankpin. With the staggered cylinders the crankcase can be made smaller in diameter, thereby reducing the over-all diameter of the engine. With a fewer number of cylinders, the bore can be increased and the stroke reduced, still further decreasing the over-all diameter of the engine. A balanced crankshaft is obtained by forging the counter weights on the extreme crank cheeks integral with the crankshaft, making a more reliable engine at a reduced cost.

The "Challenger" engine has a bore of 5⅛ in. and a stroke of 4¾ in. giving a cubic displacement of 603 cu. in. Its technical model designation is R-600. It is a conventional six cylinder radial engine with two valve cylinders, the valves being operated by push rods. The valves are made of special silchrome steel, and set on bronze inserted seats. The cylinders are arranged radially 60 deg. apart, so that actually, it is two three cylinder

Front quarter view of a Fairchild cabin monoplane, powered with a new Curtiss "Challenger" engine

engines staggered to get proper firing intervals. The cylinders are of conventional design, and are constructed with cast aluminum heat treated alloy heads with screwed in steel sleeves. The cooling of these cylinders has been worked out very carefully to obtain the minimum amount of weight with maximum cooling.

The rocker boxes are cast integral with the cylinder heads. The rocker arms are mounted in shielded type ball bearings. The covers on the rocker boxes are held securely by means of two filister head cap screws, permitting removal, which gives access to the valve tappet



Front view of the new Curtiss R-600 engine, showing the small crankcase

adjustment on the end of the rocker arm. The adjusting screw is fitted with a ball with cylindrical integral extension, which bears against the end of the valve stem, reducing the side thrust of the valve stem, and increases the life of the wearing parts. Push rods are of duralumin with hardened steel ball ends.

The pistons are of the regular Curtiss ribbed design with five piston rings; two compression and two oil scraper rings above the piston pin, and one oil scraper ring below it. The pistons have domed heads to obtain a compression ratio of 5-1/3 to 1, which also gives a large volume inside of the piston for the collection of oil after the engine is stopped, so that oil cannot run into the combustion chambers through the oil drain holes in the pistons.

Two master connecting rods, each fitted with two short rods, are used. The master rod has four large studs in the cap for attaching the main section of the rod. There are two sets of lugs on the cap for attaching the short rods. The design makes a very rigid cap with good support for the babbitt lined, steel back connecting rod shells. The bearings for the short rods are bronze bushings. Case hardened wrist pins are used. All rods are heat treated steel of "H" section design.

The crankshaft is of the two-throw type with counter weights forged to the two extreme cheeks. The first engines were built with a small counter-weight to determine the desired weight of the shaft, but production engines will be built without these counter-weights. The shaft is mounted on three ball bearings, the one nearest the propeller being used as a combination radial and thrust bearing. There is no center main bearing.

The crankcase is made in two halves, being split through the center of the front row of cylinders, a very rigid construction. The rear half of the crankcase is cast integral with the induction manifolds and accessory drive gear housing. Four bosses for mounting the engine are cast integral with the induction passages of this crankcase. Particular attention was paid in designing the crankcase to have as many of the machined surfaces as is possible in the same place. All induction exits, and the pad for mounting a single aircraft machine gun control drive, which is supplied for military training purposes, are the same distance from the center of the crankcase. This also applies to all cylinder faces.

All accessories are mounted at the rear of the engine on the crankcase, or on the accessory cover. All of them are driven through spur gears with the exception of the generator and the single machine gun control drive, which are furnished as extra equipment and are driven through bevel gears. The design lends itself to production, and gives maximum quality. No adjustments of the spur gears are necessary, which reduces maintenance and assembly costs. Provision is made for driving two flange mounted, six cylinder Scintilla magnetos, the pressure and scavenging oil pump, a C-5 gear gasoline pump, a standard generator, a standard starter, one NA-U4J Stromberg carburetor, and the one gun control.

When originally designed, the engine used a single five lobe cam, driven by four spur gears through a jack shaft, thereby doing away with all internal gearing. It was found, however, that the engine would not run smoothly,

Rear quarter view of the "Challenger," showing how the induction manifolds have been cast as an integral part of the crankcase

or develop its power with the firing order obtained with this cam. Therefore, two five lobe cams of identical design, bolted together, were substituted to give even firing in each manifold. Details of the design of this cam mechanism, which runs at one-tenth the engine speed, are due to A. H. Leak, Project Engineer on this engine.

The carburetor is attached to the crankcase at the bottom end at the rear, in order that it will be at the lowest point for use with a gravity gasoline system. The elbow connection is exhaust jacketed. The exhaust heat from

(*Continued on page* 838)

"Liberty Bell" Biplane

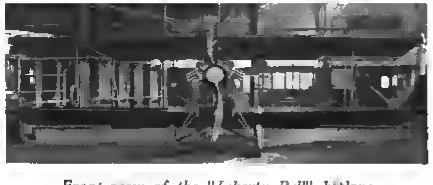
New Three Place Plane with Combined Cabin and Cockpit Arrangement Has a High Speed of 135 M. P. H.

A NEW three place biplane incorporating an unusual combination cabin and cockpit arrangement has been developed by the North Star Aircraft Corp., of St Cloud, Minn. The "Liberty Bell," Type 100 H 4a, as it is designated by the manufacturer, has an enclosed cabin in the forward part of the fuselage and an open cockpit behind it. The power plant is a Wright Hispano Type E engine developing 180 h.p. at 1650 r.p.m. Production on this plane is expected to start in the near future.

The new Liberty Bell was designed by Capt. W. Hoseas Monlar for general transportation service including passenger, mail and express work. It is of conventional construction having wood wings, welded steel tube fuselage and split type landing gear. Both upper and lower wings have a span of 30 ft. 10 in. and a chord of 63.5 in. The overall length of the plane is 22 ft. 10 in. and the overall height 9 ft. 6 in. The plane weighs 1335 lb. empty and carries a pay load of 450 lb.

In performance the Liberty Bell shows a high speed at sea level of 135 m.p.h. and a landing speed of 40 to 45 m.p.h. It will climb fully loaded to 16,000 ft. in 60 min. The cruising speed at 2/3 throttle is 125 m.p.h. and the fuel consumption at that speed is 9.5 gal. per hr.

There is ample space for two passengers in the roomy cabin which is located in the front station of the fuselage and streamlined toward the nose. The cabin is entered through a door in the left side of the fuselage and has sliding Pyralin windows in the sides and a fixed window in the rear. It is constructed of steel tubing faired with Balsa wood and covered with fabric. Behind the passengers' cabin is the pilot' cockpit which is leather upholstered and like the cabin equipped with a safety belt. A semi-circular bakelite instrument board accommodates Pioneer tachometer, altimeter, compass, oil pressure guage, thermometers, gasoline guage and magneto and lighting switches. The flooring is five-ply Haskelite maple outside with basswood filler. A separate compartment for baggage is built into the fuselage behind the pilots' cockpit and is accessable through a door in the side of the fuselage. The cockpit is entered by means of walkways on the wing and a step on the side of the fuselage. Equipment includes tool kit, fire extenguisher and navigation lights. The cabin windows and the position of the seat provides excellent visibility ahead and to the sides.



Front view of the "Liberty Bell" biplane

Dual stick control is provided and the extra stick in the cabin is removable. The ailerons are actuated by a bell crank system and the rudder and elevators by push-pull rods. Babbitt bearings are used in the control system and alemite lubrication is provided. Throttle, spark and mixture controls for the engine are also installed and control mechanism is visible for inspection.

No wire bracing is employed in the fuselage which is constructed entirely of chrome molybdenum steel tubing in the form of a truss. Fuselage and turtle deck are

Side view of the new "Liberty Bell"

faired with balsa and covered with Flightex fabric. The headrest is gradually streamlined into the turtle deck. All tail surfaces are constructed of steel tubing and covered with fabric. The stabilizer is adjustable in flight.

A firewall consisting of two thicknesses of aluminum with asbestos between separated the engine section from the remainder of the fuselage. The engine mounting is built of steel tubing with 1½ in. tubular bearers and is not detachable. The mounting is built in the form of a Warren truss. A metal framework attached to engine bearers and longerons supports the cowling which is 16 guage aluminum and is burnished. Ventilation is provided through louvres in the bottom of the cowling. The engine is equipped with a Hamilton Steel propeller with an adjustable spinner, a battery type booster for starting, curved exhaust stacks and a streamlined manifold. An exhaust heater is installed in the cabin.

Three fuel tanks, constructed of 22 guage aluminum, are provided, two of which are built into the wings and the other into the fuselage. The fuselage tank is of 35 gal. capacity and is suspended on chrome molybdenum steel hangers. Wing tanks have a combined capacity of 34 gal. and feed gasoline to the carbureter through ½ in. copper tubing. Fuel from the main tank is forced up to the wing tanks by an engine inertia pump. The flow of gasoline is controlled by cocks in the pilots' cockpit.

Landing gear radius struts are hinged to the lower fuselage longerons and shock absorption is effected by

(*Continued on page* 836)

Parachutes in Civil and Commercial Aviation

By FREDERICK R. NEELY

TWO important expressions of opinion regarding the parachute in civil and commercial aviation were voiced recently by officials in the Aeronautics Branch of the Department of Commerce.

One affects parachute jumping, for purposes other than saving lives in emergencies, and the second deals with the lack of a departmental regulation requiring all passengers carried in air transports to wear the aerial life preservers.

Maj. Clarence M. Young, director of aeronautics, has rendered an interpretation of the air commerce regulations and air traffic rules as they apply to parachute jumping. His interpretation restricts, but does not prohibit exhibition leaps.

In making the interpretation, Major Young places parachute jumping in the catagory of acrobatic flying, in that it is an intentional maneuver not necessary to air navigation. Further, parachute live jumps, as well as dead load drops for testing purposes, he places in the same category as that of dropping objects from planes. The pilot is held responsible should such jumps or drops endanger life or injure property.

Ban Jumps Over Certain Areas

The regulations, as interpreted by Major Young, prohibit parachute jumping over the congested areas of any city, town or settlement. They prohibit parachute jumping over any open-air assembly of persons. Likewise, they prohibit parachute jumping from an altitude of less than 2,000 ft. over any established civil airway. They also prohibit parachute jumping at any height within 1,000 ft. horizontally of an established airport or landing field. In addition, the regulations require that a jump, where permitted, shall be made so that the parachute opens above 1,500 ft.

The one object, behind these restrictions on parachute jumping, is safety for the jumper and safety for the spectators. The regulations were not formulated because the departmental officials think the parachute is unreliable and may not open. Of course, it is held, the professional jumper will not deliberately plan his jump to land in dangerous territory, but he knows, probably better than anyone else, the extent to which a parachute may be controlled.

Recently, Aviation Chief Machinist Mate William F. Scott, of the Naval Air Station at Anacostia, D. C., landed on the fire escape of an apartment house following a 15,000 ft. jump over the City of Washington as part of his program to break the world's record of 24,000 ft. held by Capt. Albert W. Stevens of the Army Air Corps. Scott's jump was planned at that high altitude with the view of landing on Bolling Field first of all, but if not there, then in some of the sparsely settled territory nearby. As good as Scottt is, he floated over the city, and finally landed near the Capitol. He luckily escaped serious injury in coming to rest in such an unusual attitude and place. Scott's case is an exception.

Under the interpretation place on the regulations by Major Young, the crowds gathering at the various carnivals and fairs throughout the country no longer will witness parachute jumps made directly overhead or from a point where the wind will carry the jumper as that he can float down to a panel in full view, and within a few feet, of the anxious spectators.

Miss June, noted woman parachute jumper, making an exhibition leap

While the Department is bent on conserving life and limb through its regulation concerning the parachute

(*Continued on page* 834)

The "Kari-Keen Coupe"

A Two Place Enclosed Cabin Monoplane for Business or Pleasure Powered with a Velie 45 Hp. Radial Engine

WITH the intention of providing the salesman, the business man and the private owner with an economically operated means of air transportation that can be used to advantage in small fields where quick take-offs and slow landings are essential, Kari-Keen Aircraft, Inc., of Sioux City, Ia., is producing a full cantilever wing two-place cabin monoplane that is as neatly upholstered and finished as a modern automobile.

The Kari-Keen coupe is powered with a 45 hp. 5 cylinder radial air cooled Velie engine, which is fastened to the engine mount of welded steel tubing that is integral with the fuselage. The engine cowling is of aluminum and extends back to a point even with the front part of the door opening, and an inspection door of ample size is provided on either side. The fire wall is of aluminum and to the rear of the engine is located a 4 gal. oil tank with the filler cap on the top of the cowling, so as to be readily accessible. A 28 gal. gasoline tank forming the leading edge of the center of the wing and extending to the front of the foremost spar has a pipe line shut off at each side of the fuselage, near the under side of the wing, that can be easily reached by the pilot and passenger when within the cabin of the plane. This is an extra safety measure in case of a forced landing.

Each side of the landing gear, which employs a shock cord arrangement, is independent of the other and is so placed as to make possible a wide tread of 6 ft. The landing gear struts are of streamlined tubing, with a short round tubing for the axle being faired into that of the streamlined tubing. The 26 in. x 4 in. wheels are oversize so as to facilitate a good landing in soft fields. The tail skid, which has a removable shoe, is built up of steel spring leaves fastened to the stern post and is mounted on a swivel so as to be more maneuverable on the ground, with a spring holding the skid in a fore and aft position for landing.

The empennage is built of welded steel tubing with the horizontal stabilizer being fixed and the vertical fin adjustable on the ground. Short streamlined wires for bracing run from the upper and lower surfaces of the

(*Continued on page* 830)

Four Bolts Hold Wing

The wing is built in one continuous panel and tapers in section as well as in plan from the turtle back, being 7 ft. 6 in. at the center of span and narrowing in chord at the tip to 4 ft. 6 in. It is fastened to the fuselage by four ample size bolts that can be quickly inspected as they are always visible. The leading and trailing edges are duralumin and steel tubing is used to shape the curved ends of the wing and the tail surfaces. An Eiffel No. 35 wing section is used with the spars built up box type with spruce Haskelite and the ribs of basswood so designed as to withstand extreme loads under severe conditions. The ailerons, which are set in about 2 ft. from the outer edge of the wing or at the end of the tip curve, have the forward part partially enclosed in a channel set in the wing so there is no gap when they are moved up or down.

Side view of the new "Kari-Keen Coupe," made by Kari-Keen Aircraft, Inc.

The Goodyear "Puritan"

Sister Ship of the "Pilgrim" Has an 86,000 Cu. Ft. Capacity and Carries a Maximum of Four Passengers

NUMEROUS constructional improvements which have been worked out in the designing of proposed giant airships have been incorporated in the "Puritan," the first dirigible airship built by the Goodyear-Zeppelin Corp. of Akron, Ohio.

The new dirigible is among the smallest in the world being but slightly larger than the "Pilgrim," it sister ship, built by the Goodyear Tire & Rubber Co., and famous as the world's smallest airship. The Puritan was built largely as an experimental craft in which various details of design will be put through rigid tests before being used in larger ships. Many of the improvements found in the little dirigible will be used in the giant 6,00,000 cu. ft. Zeppelin-type airships which the company hopes to build for the United States government. Foremost lighter-than-air experts of the United States and Germany have been working on plans for such ships for the past four years.

Probably the most interesting feature of the Puritan, from an engineering standpoint, is the framework of its car and keel. This is built of duralumin girders of improved design. Openings in the girders are circular or nearly so, a shape which has been found to produce greatest strength, combined with extreme lightness. The girders are exactly like those which are specified for the proposed giant airships.

The passenger cabin, built of sheet duralumin over a girder framework, is supported by a keel shaped much like a flat iron. This keel is contained inside the gas envelope, making the cabin an integral part of the bag.

The Puritan obtains its lifting power from 86,000 cu. ft. of helium gas. Two Ryan Siemens five-cylinder radial air-cooled engines developing 70 hp. each drive the ship at a cruising speed of 46 m.p.h. and a maximum speed of 55 m.p.h. The engines are mounted on outriggers so as to insulate them from the rest of the ship as much as possible, reducing noise and vibration in the cabin. Carrying the maximum of four passengers, the ship has a cruising range of 350 mi. With but two passengers, the range is 550 mi. The overall length is 128 ft., and the greatest width is 37 ft.

A Single Landing Wheel

One of the innovations in design is a single landing wheel projecting below the center of the cabin. This wheel, mounted on a duralumin frame, acts as a support for the ship when it is on the ground, and permits easy rolling from one place to another. Because of the fact that the airship is lighter than the air it displaces, the strain put on the single wheel in landing is almost negligible when compared to that on the wheels of an airplane. Another new development is the addition of a vertical rudder on top of the gas bag, at the tail. This provides greater stability. Additional steadiness is provided by the propellers turning in opposite directions.

The Puritan was designed for a number of uses. In

(*Continued on page* 828)

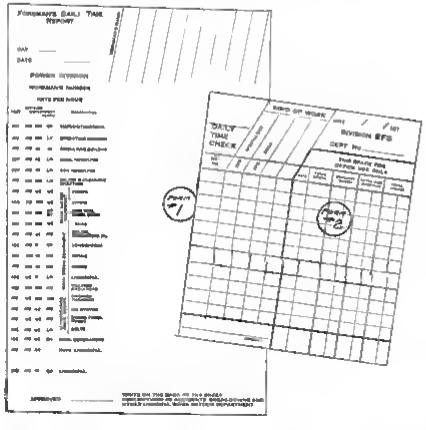
Front quarter view of the new Goodyear "Puritan" on the ground

Labor Tickets, Their Forms and Uses

By Edwin R. Douglas
Consulting Engineer

As was stated in a previous article, the forms of labor tickets are multitudinous. In size, they vary from a three by five inch card to 9x13 in. sheet. One ticket may record the time of one man, or of many, on one job, or on a number of jobs. Samples of some of these forms are given in the illustration.

Many of the items on these tickets have peculiar application to the industries where they were used, but some



things are essential to all labor tickets. These essential things are

(a) A clear indication of the work
(b) The block-number of the workman
(c) The date when work was done.
(d) The amount of time spent.
(e) Space for extending the wages.

In addition, it is frequently desirable to include

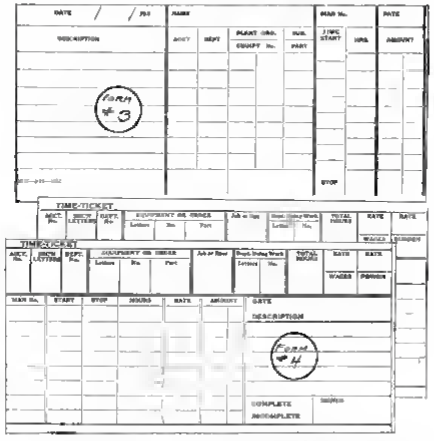
(f) The quantities desired and actually produced, spoiled, etc

(g) The number of the machine or work-place.

Sometimes, still other data is called for.

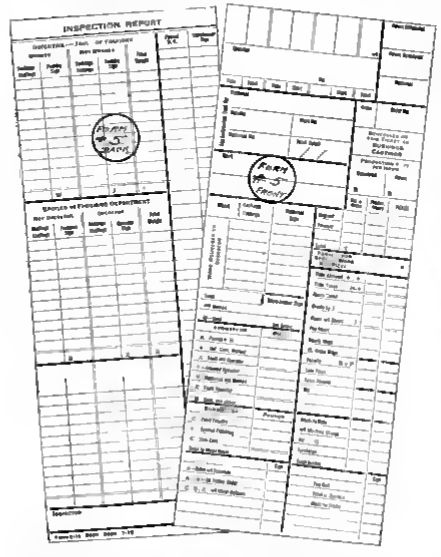
Where tickets are prepared in advance, to be scheduled through a control board, it is necessary to confine each ticket to the work of one man, or group of men working together, and to one job, or operation. Of the tickets illustrated, forms one, two and three could not be so used, as they cover several jobs on one ticket. Forms four to eight could be so used, as each of them covers the work of but one man, or group on one job. Forms five, six and eight are especially intended for this purpose, having spaces for entering the scheduled allowances. Number five is interesting because of the very full amount of data given. This was used on a product where many small pieces, often hundreds or thousands all alike, were machined on each order to close limits, checked by very full inspection. A penalty was imposed for spoiled work, and a bonus paid for time saved. The ticket provides, on front and back, for the inspector's detailed report, and for a statement of results to be transferred to production-schedules, etc., and for computing penalties, bonuses, wages, machine-charges and burden.

Tickets numbers four and six are printed in duplicate. They are perforated to tear apart, with the top copy self carbonized on the back, and are folded for writing. This is a very good plan. While both copies stay together until put in work, the top copy only is given to the work-



man, while the second copy then is used in the top pocket of the control board, to show the job in work, as already described. Where this duplicate arrangement is not used, the control board clerk is obliged to write a slip, bearing the order number and man's number, to be placed in the top pocket of his board, when the original is given out to the workman.

Ticket number eight is interesting by reason of the manner in which it gives information to the time keeping department. No matter which of these forms of single job tickets be used, it is vitally necessary that the total time of each man, as shown by all his job tickets, be checked and proved against his morning-in and evening-out clock records. This is usually done daily, although it is sometimes done only once a week. Unless this proof is made, undiscovered errors are sure to occur, so that the total amounts charged to costs do not agree with the



totals paid as wages. With any of the tickes from number four to seven, this means that, at each checkup, all tickets in work must be withdrawn and sent to the time-keeping department, being replaced by continuation tickets, newly written, and put back on the jobs. When checked daily, this involves a very considerable amount of overtime by control board clerks, as the continuation tickets must be written after close of work one day and all be in place before start of work the next day. If the shop is working overtime, this considerably complicates the matter. If, to save the clerical work, the check-up is made but once a week, the difficulty of correcting errors becomes much greater.

Defects are Greatly Reduced

With the form of tickets illustrated as number eight, these defects are greatly reduced. The original ticket may remain at the job until the work is finished, be that days or even weeks, with no continuation tickets to be written. Yet the time keeping department is assured that job-coss and wages will be in balance. The manner of using this ticket is illustrated below, where four consecutive tickets are shown, for jobs on the same machine. These are here marked, for reference (a), (b), (c), (d).

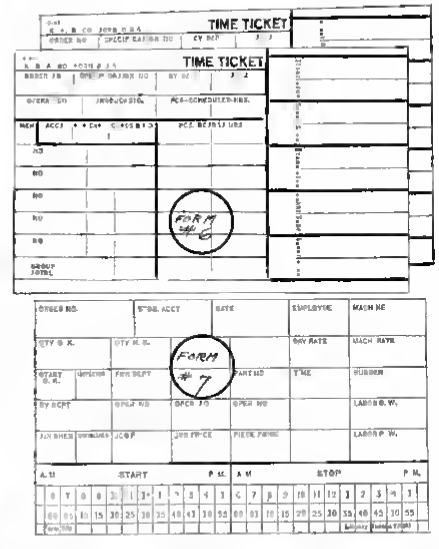
Tickets "a" and "b" are shown as having been completed and sent to the office. Ticket "a" has been figured and posted; ticket "b" has not yet been figured; ticket "c" has been started in work, but is not yet finished. It is at the machine, with a copy of it at the control-board, "in-work." Ticket "d" has not been started yet. It is at the control-board as "next job."

It is noted that each ticket has space for two lists of order numbers, part numbers and so forth. The list on the left was put on in the planning department when the ticket was originally written, and is the job, for which the starting and stopping times are given on the ticket. The second or right-hand list, as on ticket "b," is copied on by the control board clerk when he stamps the job "finished," it is a memorandum for the cost department of the next job put in work, as shown by ticket "c." This order number is noted by the cost department against the man's number.

Cost Department Keeps Check

From that moment, all his time in charged against that order every day, until the next card "c," bearing that order number comes through "finished." When it does, it in turn will have copied on it by the control board clerk, as a "memo," the "next" job, which is taken from ticket "d" when that is given out for work. In this way the cost department is always aware of what order each man is on, and there is no chance of an hour or two slipping in or out through in error in figuring tickets.

The "blanket" tickets numbers one, two and three, are useful in cases where certain groups of men work, with little change on certain fixed jobs, or on outside repair



and construction jobs where work is not scheduled, where it is not convenient for the men individually to report on and off their jobs, and where the foreman keeps track of what they are doing and makes report of it daily. While sometimes convenient, it is not an accurate method of reporting time, or obtaining costs. If men change fre-

(*Continued on page 828*)

Complete Program of Air Race Events Announced

Numerous Specialties Scheduled for Show Beginning Today at Mines Field

LOS ANGELES, CALIF.—The complete program of events for the National Air Races has been made public by W. E. Thomas, program committee chairman.

According to the schedule that has been announced, the gates will be open from 10 A. M. to 10 P. M., the Aeronautical Exposition being open to the public during this period each day. New models of airplanes and aviation engines, Army and Navy exhibits, and practically every form of appliance and equipment used in navigating the air will be on display in the big 400 x 500 ft. exposition building.

With three separate transcontinental races from New York, including the non-stop event, one from Windsor, Ontario, one from Mexico City, and a Pacific Coast derby from Oakland to Los Angeles, as well as the San Francisco to Los Angeles derby, it is certain that new planes will be dropping in on the field at almost all hours for the first five days of the Air Race program. An array of comedy stunts and special events is being incorporated in the program in addition to the regular events to insure the spectators having no dull moments. Each evening a symbolical extravaganza will be presented on a stage before the huge grandstand, while more than 100 fliers will participate in night flying, parachute flare demonstrations and aerial fireworks.

The dedication of Mines Field as the Los Angeles municipal airport is being planned in connection with the presentation of the Air Race trophies on the day following the close of the events. The program of events is as follows:

Program of Events

Saturday, September 8—1:30 P. M., band concert; 1:30 P. M., 300 airplanes start meet by massing parade over city of Los Angeles; 3:00 P. M., return of airplanes to Mines Field; 3:30 P. M., three special Navy events; 4:00 P. M., Al Wilson stunting with autogyro pusher plane; 4:30 P. M., Army stunts; 5:00 P. M., balloon jump; 7:00 P. M., band concert and start of attempt to break world's endurance flight record; 7:30 P. M., air extravaganza on stage before grandstand; 8:30 P. M., demonstration of parachute flares; 9:00 P. M., Al Wilson in night flying stunts with flares and fireworks.

Sunday, September 9—1:30 P. M., band concert; 2:30 P. M., around-the-world memorial race; 2:30 P. M., wing-show parachute jumping by Army flyers; 3:30 P. M., stunts by navy flyers; 4:00 P. M., Al Wilson stunting ancient pusher plane; 4:30 P. M., Army stunt flyers; 5:00 P. M., balloon jump; 7:00 P. M., band concert; 7:30 P. M., air extravaganza on stage before grand stand; 8:30 P. M., National Guard fliers fireworks display, red parachute flares; 9:00 P. M., Al Wilson, night flying with flares and fireworks.

Monday, September 10—10:00 A. M., finish of Transcontinental Air Derby, New York to Los Angeles, Class A, B and C; 1:30 P. M., band concert; 2:00 P. M., dead stick landing prize and trophy; 3:30 P. M., Navy stunt fliers; 4:30 P. M., Al Wilson stunting pusher plane; 4:30 P. M., Army stunt fliers; 5:00 P. M., balloon jump; 7:00 P. M., band concert; 7:30 P. M., stage show before grandstand; 8:30 P. M., parachute flares; 9:00 P. M., Al Wilson, night flying with fireworks.

Tuesday, September 11—1:00 P. M., finish of Pan-American race from Mexico City; 2:00 P. M., finish of Class A race, San Francisco to Los Angeles; band concert by navy band; smoke screen laying by planes; 2:30 P. M., formation flying by Marine Corps; 3:00 P. M., Falcon race for Marine Corps; 3:30 P. M., dropping bombs to target and circle formation flying; 4:00 P. M., dive bombing formation; 4:30 P. M., parachute jump by Marine Corps; 5:00 P. M., Navy circuit race; 7:00 P. M., band concert; 7:30 P. M., stage show before grand stand; 8:30 P. M., Navy night flying exhibition; 9:00 P. M., Al Wilson night flying with flares and fireworks.

Wednesday, September 12—1:30 P. M., band concert by Army band; 2:00 P. M., Army dead stick landing contest; 2:30 P. M., Army formation flying; 3:00 P. M., Mitchell Trophy Race for military planes; 3:30 P. M., finish of California Class B race, Oakland to Los Angeles; 4:00 P. M., General Patrick Trophy Race for military planes; 4:30 P. M., Army bombers formation flying; 7:00 P. M., band concert by Army band; 7:30 P. M., show on stage; 8:30 P. M., Army night flying program; 9:00 P. M., Al Wilson in night flying exhibition.

Thursday, September 13—10:00 A. M., finish of Transcontinental Non-stop race, New York to Los Angeles; 10:30 A. M., California model aircraft exhibitions; 11:00 A. M., model airplane flying contest; 1:30 P. M., band concert; 2:00 P. M., introduction of famous fliers; 2:30 P. M., relay race for civilians, four teams, five planes each; 5:00 P. M., obstruction plane race; 5:30 P. M., start of Army and Navy race, 120 mi.; 4:30 P. M., free for all race, civilians only; 5:00 P. M., U. S. Army fighting airplane stunting; U. S. Navy formation flying; 7:00 P. M., band concert; 7:30 P. M., stage show; 8:30 P. M., parachute flares; 9:00 P. M., Al Wilson stunting.

Friday, September 14—12:30 P. M., band concert; 1:30 P. M., free for all race for civilians only; 2:30 P. M., Navy plane race, pursuit type; 3:30 P. M., light airplane speed and efficiency contest for civilians; 4:00 P. M., Pulitzer Guard race; 5:00 P. M., closed course events for commercial planes, closed course events for Army planes, parachute jumping, Army stunts and formation flying; 7:00 P. M., band concert; 7:30 P. M., stage show; 8:30 P. M., parachute flares; 9:00 P. M., Al Wilson in fireworks flying.

Saturday, September 15—1:00 P. M., band concert; 1:30 P. M., free for all 100 mi. race, civilians only; for Aviation Town and Country Club of Detroit Trophy; 2:30 P. M., Army stunts; 3:30 P. M., closed course races for commercial planes; 3:30 P. M., closed course for Navy planes; 4:00 P. M., special race for National Guard, Army and Navy; 5:30 P. M., Army and Navy attack balloon in battle formation and balloon destruction, parachute jumping; 7:00 P. M., band concert; 7:15 P. M., address by distinguished guest; 7:30 P. M., air extravaganza on stage before grandstand; 9:00 P. M., Al Wilson night flying with flares and fireworks.

Sunday, September 16—1:00 P. M., band concert; 1:30 P. M., free-for-all military pursuit race, 120 mi.; 2:00 P. M., closed course races for civilian planes of commercial type; 2:30 P. M., civilian stunting; starts to Army and Navy pursuit plane racer; 3:00 P. M., Navy stunting, three specials; 3:30 P. M., blowing up of village by Army and Navy planes; 4:00 P. M., parachute jumping, finals.

Four Airplanes Get Certificates

WASHINGTON, D. C.—Four more airplanes have lately been awarded approved type certificates by the Aeronautics Branch, Department of Commerce. The total number of approved planes is now 67.

The four newly certified aircraft are 64, Boeing B-1E, four place closed biplane flying boat, Waap; 65, Cessna A, four place closed monoplane, 120 hp Anzani; 66, Loening, five place closed amphibian biplane, Hornet; and 67, Loening six place closed amphibian biplane, Cyclone.

Seven Are Honored For Flight to Alaska

WASHINGTON, D. C.—Pilots and mechanics who participated in the Alaskan Air Expedition organized in 1920 have been awarded the Distinguished Flying Cross. Those who received the honor are Capt. St. Clair Streett, Lieuts. Clifford C. Nutt, Clarence E. Crumpwine, and Erik H. Nelson, former Lieut. Ross C. Kirkpatrick, former Sergts. James D. Long, and Sergt. Joseph E. English.

A pioneer flight, the Alaskan Air Expedition was made to demonstrate the practicability of transporting an air force over long distances with a minimum of preparation, to establish a precedent for future military and commercial operations and for engines and equipment in a cold climate.

The expedition, which consisted of four De Haviland airplanes equipped with Liberty engines, started on July 15, 1920, at noon, from Mitchel Field, L. I. More than half the distance covered lay over mountainous and sparsely settled country, of which maps were incomplete and inaccurate.

The planes landed at Wrangel, Alaska, on August 14; Dawson, August 18; Fairbanks, August 19, and Nome, August 24. Total flying time from New York was 53 hr. 30 min., while the total distance covered was 4,500 mi. On the return flight, the planes reached New York on October 20, with a total of 112 hr. flying for the round trip.

High Production for Axelson

WICHITA, KAN.—J. C. Axelson, president of the Axelson Machine Co. of Los Angeles, now manufacturing Floh airplane engines under the name of Axelson engines, declared while in Wichita en route from New York to Los Angeles, that by the first of the year his concern will be turning out between 300 and 400 of the 150 hp. radial air cooled engines a month. William Jardh is chief designing engineer for the Axelson company.

Licensed Pilots List Issued in Washington

WASHINGTON, D. C.—A directory of all licensed pilots listed by the Department of Commerce up to July 31, 1928 including 2,678 names has been issued. Pilots listed represent all the states except New Mexico, it is stated, as well as the District of Columbia, Alaska, Hawaii and miscellaneous possessions.

Pilots now operating under authority of the Department of Commerce number 4,898. It is explained. Only 2,678 of these however, listed in the directory, are actually licensed. The remainder are flying under letters of authority, a temporary license of two weeks' duration, pending examination.

The largest number of licensed pilots in a single State is reported for California with a total of 417.

Pilots licensed in each State and possession are reported as follows: Alabama, 26; Arizona, 5; Arkansas, 32; California, 417; Colorado, 66; Connecticut, 30; Delaware, 3; District of Columbia, 147; Florida, 56; Idaho, 5; Georgia, 24; Illinois, 161; Indiana, 47; Iowa, 35; Kansas, 66; Kentucky, 18; Louisiana, 19; Maine, 7; Maryland, 31; Massachusetts, 57; Michigan, 124; Minnesota, 55; Mississippi, 10; Missouri, 107; Montana, 6.

Nebraska, 30; Nevada, 4; New Hampshire, 2; New Jersey, 36; New York, 238; North Carolina, 17; North Dakota, 3; Ohio, 132; Oklahoma, 51; Oregon, 26; Pennsylvania, 130; Rhode Island, 3; South Carolina, 4; South Dakota, 12; Tennessee, 38; Texas, 109; Utah, 18; Vermont, 1; Virginia, 109; Washington, 41; West Virginia, 5; Wisconsin, 48; Wyoming, 25; Alaska, 9; Hawaiian Islands, 29; and miscellaneous, 5.

The directory, Aeronautics Bulletin No. 20, may be had free of charge on application to the Aeronautics Branch of the Department of Commerce.

Fogg Flight Director For Keene Dedication

KEENE, N. H.—Lieut. Robert S. Fogg of Concord, N. H., has been named to direct all flying operations at the official opening of the Keene Airport here on Friday and Saturday, September 21-22, according to an announcement by Patil W. Shedd of the operating committee. Keene Airport, Inc. Lieutenant Fogg is technical advisor of the company.

Exhibition flights, some by service planes, parachute drops, races, passenger carrying, etc., is included in the program which is planned for the field dedication. Transport pilots only, with registered planes, will be permitted to fly. Fuel and expenses will be provided for fliers.

Mechanics' School at "Y"

BROOKLYN, N. Y.—A school for aviation mechanics has been opened by the Bedford Branch of the Y. M. C. A. The new course includes airplane principles, welding, machine shop practice, etc.

Shooting the Sun

Caudr. M. R. Pierce of Lakehurst (N. J.) air station testing his sextant camera which was built by the Eastman Kodak Co., and will be used by the Byrd Expedition.

Air Meet Planned for Vermont Field Opening

NEWPORT, VT.—Flying exhibitions and prize races are scheduled to be held at the Canadian Gateway Airport on the occasion of the field's dedication September 14 and 15. The airport is the home of the Vermont Airways Corp. of Newport.

Governor Weeks, Senators Dale and Greene, and other officials of State and Government have been invited. Invitations, furthermore, have been sent to 212 pilots including both commercial and Army fliers. The list also includes several fliers from the Canadian side of the line.

The meet is being arranged by the Vermont Airways Corp., assisted by the International Chamber of Commerce of Derby Line, Vt., and Stanstead Quebec and the Newport Chamber of Commerce.

The Vermont company, organized last spring is operating a school of instruction in which 12 students are now enrolled. Two Ware planes are employed and good flight traffic is reported both in short and long trips.

Finat Breaks Brond's Record

PARIS, FRANCE—Captain Broad's light plane endurance record of 24 hr. duration is reported to have been surpassed here by Maurice Finat, piloting a "Baby Avionette" plane powered by a 40 hp. engine. Finat is credited with a flight of 24 hr. 36 min. and 33 sec.

Aviation Night Course Offered

New York University to Teach Practical Aeronautics in Three Years

NEW YORK, N. Y.—In cooperation with the Extension Division of New York University, the Evening Engineering Division of that school will offer a three-year course in practical aviation leading to a certificate of proficiency, according to an announcement by Collins P. Bliss, associate dean of the College of Engineering in charge of the Evening Division. The new course is intended for those associated with the practical commercial use of aeroplanes who have not had the time or the preparation to take a full four-year course in advanced aeronautical engineering as is now offered in the Guggenheim School of Aeronautics.

The first printed catalog which describes the scope of the work explains that it is especially suitable for the ambitious mechanic and professional pilot who wishes to fit himself for executive work in the factory and at the airport, or for an air transport line. The students will study the elemental problems of aircraft design, weather, equipment, airport construction, lighting, air transport, and traffic questions.

High School Training Desirable

Dean Bliss suggested that it is desirable that an applicant should have at least two years of high school training, although the course is so arranged that by taking the full three years of work the necessary high-school prerequisites for each subject are included. Those having advanced standing from recognized sources satisfactory to the university may be able to complete the work in less than three years.

Registration for this course will be held at Washington Square Main Building, until September 12, excepting Saturdays. Classes will start during the week of September 17. Lecture and recitation classes will be held at the Washington Square center of the university, but laboratory classes will meet at University Heights where they will avail themselves of the extensive laboratories of the new building of the Daniel Guggenheim School of Aeronautics.

Officers in Charge

Officers of the faculty who are guiding the work of this special three-year course in practical aviation are: Charles H. Snow, dean of the College of Engineering; Rufus D. Smith, director of the University Extension Division; Collins P. Bliss, associate dean of the College of Engineering; Prof. Charles E. Gus, assistant director; and Douglas S. Trowbridge, assistant to the director.

The advisory committee includes Richard H. Depew, C. M. Jones, Harry F. Guggenheim, James H. Kimball and Alexander Klemin, director of the Daniel Guggenheim School of Aeronautics.

Will Hold State Meeting at Show

Schedule California Development Association Conference for September 14

LOS ANGELES, CALIF.—Aviation enthusiasts from all parts of the country have been invited to attend the Third State-Wide Aeronautical Conference of the California Development Association. Leading aviation authorities from many branches of the industry will be present to discuss problems of finance, insurance, and economic phases of the general development of aviation. R. E. Fisher, chairman of the Aeronautical Committee of the association has announced the meeting for September 14 in the Alexandria Hotel, Los Angeles. Coming as it does, during the National Air Races and International Aeronautical Exposition, this conference is expected to prove the largest and most beneficial of any yet held in California.

Charles R. Detrick, Insurance Commissioner for the State of California, will lead the insurance group in the presentation of aeronautical insurance data. Thomas B. Eastland of Bond, Goodwin & Tucker, Inc, and a director of Transcontinental Air Transport, Inc., will organize discussions on operating costs and upkeep of field and terminal equipment. The general development phase of the program will be under the guidance of Edwin O. Edgerton, whose group will present data on landing fields, airport equipment, standardization of runways, development of radio beacons, and many other of the problems incident to the general development of aviation.

Swift Plane Has High Speed

WICHITA, KAN.—The two-place biplane manufactured by the Swift Aircraft Company of Wichita promises to be one of the speediest of flight biplanes. In recent tests the small plane attained a top speed of 135 m. p. h. and a cruising speed of 110 m. p. h.

Installation of a new type stabilizer has added to the smooth flight of the plane, according to C. B. Bennett, chief engineer of the Swift company. The biplane is powered with the Quick engine.

Richfield Fokker Pictured

Through error, the cover picture of the September 1 issue of AVIATION carried the caption, "A Western Air Express Fokker F-10 Over the San Bernardino Mountains, Southern California." The Fokker monoplane pictured is, in reality, that being operated by James Talbott, president of the Richfield Oil Co. of California.

New Plant for Hamilton Aero

MILWAUKEE, WIS.—Erection of a new plant by the Hamilton Aero Manufacturing Co., is planned for the near future, according to Thomas Hamilton, president. Demand for the company's propellers, pontoons, and other equipment, has necessitated a building program, he said, but the company is not yet ready to announce the extent of the improvements planned.

Two large contracts, one with the Government, have just been closed, stated Mr. Hamilton. The company recently increased its stock from 2,000 shares of no par value common to 3,000 shares, consisting of 2,000 no par common and 1,000 shares of preferred, par $100.

Hassell and Cramer Found in Greenland

ROCKFORD, ILL.—According to information received here Bert Hassell and Parker Cramer, who were believed to be lost in their attempted flight to Sweden in the Whirlwind powered Stinson Detroiter monoplane Greater Rockford, have been rescued in Greeland by the University of Michigan Expedition under the leadership of Prof. W. H. Hobbs. The fliers were forced down August 19 by lack of gasoline on the Sukkertoppen ice arm 50 mi. from Mount Evans where the base for the expedition had been established and where they intended to land. Neither flier was injured in the landing and the two immediately set out to cross the unknown interior of Greenland living on a ration of 8 oz. of pemmican a day.

Smoke from a fire built by the fliers attracted the attention of a party of Eskimos who reported their discovery to members of the expedition and two power boats were sent to rescue the aviators. They arrived at the Mount Evans base on the evening of September 2 and as yet have made no plans for their return to the United States. When word of the fliers' rescue was received here a gigantic public demonstration was staged and plans are underway to welcome the aviators on their return here.

Army to Lend Old Equipment

WASHINGTON, D. C.—Under the provisions of a recently approved act of Congress the Secretary of War is empowered to transfer or lend obsolete airplanes and aeronautical equipment to museums and educational institutions. Annual reports must be made on the quantity and condition of this equipment and expenses of transfer must be borne by the institution. It is specifically stated in the act that none of this equipment is to be used in actual flying.

First Aircraft Show Being Held at Akron

AKRON, O.—The first aeronautic exposition ever held in Akron is now in progress (September 4-11) at the M. O'Neil Co. department store. The show is being given purely for the purpose of stimulating local interest in air activities and to make it possible for the "man on the street" to learn something of modern aircraft and equipment. The M. O'Neil Co. does not sell any kind of aircraft.

Both lighter-than-air and heavier-than-air industries are represented. The Goodyear-Zeppelin Corp. of Akron has a large display of airship models and equipment, and of free balloon baskets and instruments. Models are being shown of such airplanes as the Junkers, Fokker, Ford, Imperial Airways English Channel planes and the like. Among the Ohio-made planes to be represented are the Waco and Simplex.

Several days prior to the opening date Lieutenant McKee and George Tourtellote of Wright Field, Dayton, O., flew an Army plane to Fulton Field and began dismantling it, prior to reassembling it in the store. Other Army exhibits include cutaway engines, altitude and cold-weather suits, parachute equipment, fuselage skeletons, etc. The exposition is free to the public.

Super Universal for Arizona Oil Company

PHOENIX, ARIZ.—A Fokker Super-Universal monoplane with a Wasp engine will be delivered to the Rio Grande Oil Co. in Los Angeles, for the use of representatives of the firm in the California and Arizona districts, according to a statement by Lynn Lockhart, district manager for Arizona.

The plane will be for transportation, rather than directly for advertising. It is hoped to secure the services of Howard Rinehart, former owner of the Van Buren Airport here, as its pilot. Mr. Lockhart is a pioneer, having flown his solo in the naval service more than 16 years ago under the instruction of Lieutenant Weddington, now in charge of Love Field, Dallas, Texas.

Legion Plans Air Program

SAN ANTONIO, TEX.—A special aeronautical program is now being arranged for the American Legion Convention to be held here October 8-13, inclusive. The activities, according to the N. A. A. committee in charge of aerial activity, includes registration of visiting airmen, reception of notables, aerial circus with 1,000 planes, assembly of commercial planes and special program for commercial pilots, reception for foreign pilots and dignitaries, air parade, night flying, aerial combat, simulated bombing, skywriting, etc., and an official early morning banquet tendered by the N. A. A.

Hunsaker Is Elected To Goodyear Office

AKRON, OHIO.—Following his election as vice president of the Goodyear-Zeppelin Corp., Commander J. C. Hunsaker, formerly of the United States Navy has assumed the duties of his new office which include research and the development of commercial relations in connection with airships for the concern. Announcement of his election was made recently by P. W. Litchfield, president of the Goodyear Tire and Rubber Co. and the Goodyear-Zeppelin Co.

Commander Hunsaker, one of the best known figures in naval aeronautics at the time of his resignation from the Navy in 1927, became research engineer for the Bell Telephone Laboratories in New York, a post he resigned to join Goodyear.

Holding an engineering degree from Massachusetts Institute of Technology, he

Comdr. J. C. Hunsaker

went abroad in 1913 to study aerodynamics, returning the following year as director of aeronautical engineering and research at M. I. T.

While in charge of the aircraft division of the Bureau of Construction and Repair of the Navy Department, Commander Hunsaker had responsibility of the Naval aircraft war program and assisted in the design of the first modern non-rigid airships produced in this country as well as the Shenandoah and NC flying boats.

From 1921 to 1923 he was chief of the design division of the Bureau of Aeronautics and has been a member of a number of Navy technical boards, the Inter-Allied Naval Armistice Commission, and was assistant naval attache at the American embassy in London.

Approve First Propeller

WASHINGTON, D. C.—The Dakota Airplane Co.'s Fahlin propeller for the 100 h.p. engine class has been awarded the first approved type certificate for air screws. The Dakota company is at Aberdeen, S. D.

New Entries in Non-Stop Race

NEW YORK, N. Y.—Late entries in the non-stop transcontinental race, which starts from Roosevelt Field, L. I., September 12, are announced as follows: Emile Burgin, Bellanca J, Whirlwind; Roger Q. Williams and Lieut. Jack Eisman, Bellance Columbia, Whirlwind; and George Haldeman, Bellanca J, Whirlwind. These entries bring the total number of planes in the transcontinental events to 75.

Many Accessories in Emery's Travel Air

WICHITA, KAN.—Very complete is the list of accessories which William N. Emery, Jr., pioneer Travel Air distributor of Bradford, Pa., has installed in his Whirlwind Travel Air. Mr. Emery believes that the passengers in the front cockpit of his craft are entitled to the same satisfaction as the pilot in knowing the speed of the plane, altitude, etc.

Believing also that the pilot should have all equipment possible enabling ease and safety of flying, Mr. Emery has made further installations of equipment for his Travel Air. In addition to the standard instruments his plane is equipped with an electric starter, landing lights, parachute flares, navigation lights, 105 gal. fuel capacity, fuel gauge, wheel brakes, dash lights (both cockpits), bank and turn indicator, clocks (both cockpits), compass, rate of climb indicator, and installation in each cockpit of air speed indicator, altimeter, and heater. The dual installations, Mr. Emery has found, saves the answering of a great number of questions and gives the passengers much satisfaction.

Kansas City Offers Prizes

KANSAS CITY, MO.—The Kansas City Chamber of Commerce has decided to offer $1,000 in prizes in connection with the National Air Races, September 6 and 7. The prizes will be for the planes in the different classes making the best time between Kansas City and St. Louis in the race. Lieut. Isaiah C. Davies of the 430th Pursuit Squadron of the Air Corps Reserves, stationed at Kansas City, will be the referee.

Leighton Joins Wright

PATERSON, N. J.—Lieut. Comdr. Bruce G. Leighton having tendered his resignation as chief of the Plans Division of the Bureau of Aeronautics, has become associated with the Wright Aeronautical Corp. of this city. He will take charge of sales. To Lieutenant Commander Leighton goes much of the credit for the development of the air cooled radial engine.

Aviation Safety Session Called

Guggenheim Fund and Safety Council to Cooperate in Holding Conference

NEW YORK, N. Y.—Many men prominent in the aeronautical industry will gather here October 4 and 5 to attend the first annual safety conference which is part of the seventeenth annual Safety Congress. This meeting is expected to mark the beginning of one of the most important movements in aviation as it is the first time that safety has been the single topic of discussion at an aviation conference. The various aspects of the problem will be discussed from all angles.

The conference will be held under the auspices of the Daniel Guggenheim Fund for the Promotion of Aeronautics and the National Safety Council. A safety contest is now being considered by the Guggenheim Fund and it is believed that a competition of this kind would result in rapid advances toward greater safety in flying.

Total of Four Meetings

In discussing plans for the conference, Harry F. Guggenheim, president of the fund, stated that the meeting will consist of morning and afternoon sessions covering two days and the problems discussed will include aeronautical legislation, aircraft design and construction, landing fields and airways and the various aids to navigation.

Special information from the full flight laboratory recently established by the fund on the Pacific Coast for the study of fog conditions will be reviewed and papers on thirty-seven specialized subjects will be presented by outstanding authorities on aeronautical problems. General subjects will be presented by experts from foreign countries.

Co-operation of the scientist, pilot, engineer, operator, manufacturer and educator will provide an extensive review of the subject.

Standard Oil Buys Planes

BAYONNE, N. J.—In a recent issue of The Lamp, official publication of the Standard Oil Company of New Jersey, announcement is made of the organization of an aviation department under the direction of the Standard Oil Development Corp. and headed by Capt. E. E. Aldrin, U. S. Army Air Service. Two planes, a Curtiss Robin, powered with a Curtiss Challenger radial air cooled engine, and a Lockheed Vega, powered with a Pratt & Whitney Wasp engine, have been purchased and will be used in experimental flying and testing of aviation oil and fuel.

Rentschler Buys Vought Airplane

First Privately Owned 'Corsair' Delivered to Pratt & Whitney Co. Head

NEW YORK, N. Y.—Delivery was made recently on the first privately owned Vought "Corsair" by Temple N. Joyce, sales manager of the Chance Vought Corp., Long Island City, who flew the new plane to Brainard Airport, Hartford, Conn., where it was accepted by the purchaser, F. B. Rentschler, president of the Pratt & Whitney Aircraft Co. Rantschler will use the new plane on his frequent business trips from Hartford to Washington, D. C. New York and other parts of the country.

The new plane is powered with a 400 hp. Pratt & Whitney Wasp engine and has a high speed of 160 m.p.h. and a cruising speed of 135 m.p.h. Rentschler states that he expects to save at least a day on each of his Washington trips because it will only take a little over two hours to go by air.

Large Baggage Compartment

The fuselage, wing struts, and landing gear are finished in a shade of blue, the wings and tail surfaces in cream and, with the polished aluminum side fuel tanks, make a very effective color combination. A large baggage compartment is provided which is fitted with two "Featherlite" suitcases bearing Mr. Rentschler's initials. A comfortable leather upholstered, arm seat is provided for the passenger in the rear cockpit. The plane however, may be flown from either cockpit, the rear stick being removable.

Wheel brakes are installed and with the steerable tail skid, adjustable stabilizer and extra large balanced control surfaces, make the plane extremely easy to handle, both on the ground and in the air and untiring on long cross country flights.

Front quarter view of Wasp powered Vought Corsair recently delivered to F. B. Rentschler at Hartford, Conn.

Approve Six Power Plants

WASHINGTON, D. C.—Engines which have been granted approved type certificates now total five, according to data made public here by the Department of Commerce. These are as follows: 1. Fairchild Caminez 447-C, four cylinder air cooled radial, 120 hp. at 960 r.p.m.; 2. Warner, seven cylinder air cooled radial, 110 hp. at 1850 r.p.m.; 3. Kinner K5, five cylinder air cooled radial, 75 hp. at 1725 r.p.m.; 4. Velie, five cylinder air cooled radial, 45 hp. at 1750 r.p.m.; and 6. Curtiss Challenger R-600, six cylinder air cooled radial, 170 hp. at 1800 r.p.m., 6. Curtiss Conqueror, 12 cylinder water cooled Vee, 600 hp. at 2400 r.p.m.

Milwaukee Aircraft Show Well Attended

MILWAUKEE, Wis.—Approximately 150 000 people visited the aircraft show in the M. & M. Building at the annual Wisconsin State Fair which was held at Milwaukee August 27 to September 1, according to Fred Borcherdt, Jr., business manager of the fair.

Three local firms displayed airplanes at the show. The Midwest Airways, Inc., state distributors for Ryan Broughams, displayed a Brougham a Waco 10, and a Swallow plane. The Weeks Aircraft Corp., state distributors for Fairchild, displayed a cabin monoplane. The Holterhoff Flying Service, Inc., displayed an American Eagle plane. Each firm stationed a man at the display to take care of people who wanted aviation trips.

The Department of Commerce Light house Service had a 24 in. airway beacon on display. There was also an extensive display of the Postoffice Department featuring air mail. The Wadhams Oil Co., a private corporation exhibited a Monocoupe plane.

Starting New Air School in Wichita

Two Schools Now Operating There to Become Part of Corporation

WICHITA, KAN.—An air pilot training school to rank with the best is being established in Wichita. Incorporation papers have been taken out under the name of National Air School, Inc., and officers of the organization have been named.

George Siedhoff is president, W. B. Harrison is vice-president, and W. H. Sanders is secretary-treasurer. Directors include John H. Engstrom, Carl Koehrling, and Walter Beech. Arch Merriam, governor for Kansas of the National Aeronautic Association has been selected as general manager of the corporation. The new school is incorporated for $50,000, but officers have indicated they have an additional $50 000 available for the school when needed.

Students will be schooled in theory, practical engine and plane building, and flying. They will be able to acquire the necessary 200 hrs. for a transport pilot's license at the school for a very reasonable price. The two Wichita flying schools, one operated by Ted Braley and the other by the Wichita Air Service Provision Co. will become part of the new corporation. A half-dozen new planes are available for school use now. Considerable new equipment will be purchased.

Major MacCracken Heads Air Mechanics

BUFFALO, N. Y.—Maj. Ralph R. MacCracken, of Lancaster, a village nearby, was elected president of the Veterans Association, Second Regiment, Air Mechanics, at the close of their annual convention here recently. Indianapolis was chosen for the next convention.

Other officers elected were: Robert M. Avery, Lackawanna, vice-president; Maj. Thos. J. Leary, Chicago, secretary treasurer; Paul D. Townsend, Chicago, assistant secretary-treasurer; the Rev. Robert J. Bustard, Philadelphia, chaplain; and Fred A. Johnson, Buffalo, sergeant-at-arms.

The executive committee is: Stephen D. King, Cincinnati, Gerald Mason, Milwaukee, Ernest P. Martin, Wooster, Ohio; Oscar W. Roesitger, Gary, Ind.

Orders Whitey Sport

OMAHA, NEB.—A new two-passenger Whitey sport plane from the White aircraft factory in Des Moines, Ia., has been ordered by O. E. Weatherly, secretary to O. D. Porter, street car company official.

Complete Course For Army Fliers

War Department Issues List of Subjects Required in Instructions

WASHINGTON, D. C.—Completeness of the training of new Air Corps pilots and units is indicated by a list of requirements which has been issued by the War Department. A resume of the training required follows.

The instruction to be required is divided into two parts, air instruction and ground instruction. Air training in turn is divided into two parts. The first being that which will be followed by all classes of aviation, pursuit, bombardment, attack, and observation and the second being two specialties in which each class will be required to become proficient. In the first division of air instruction, officers and units of all classes of aviation will be required to make sufficient individual engineering flights to obtain consumption data on gas and oil at cruising speeds at 1,000 and 10,000 ft. altitude flights progressively to ceiling of airplane with reduced and full military loads, flights to obtain consumption data on gas and oil at full speed at 10 000 ft. and at service ceiling, flights using radio telegraph and telephone, between airplane and ground and between airplanes in flight; navigation flights over triangular courses as practicable solutions of radius of action problems progressive from 100 mi. to service cruising range of airplanes, the number of individual flights to be determined locally; individual combat in which observers will man flexible guns during these flights; formation flying commencing with units of three airplanes, instruction to be progressive to squadron and group formations and will include rendezvous over objectives, problems in timing flights to distant points and flights to service ceiling with full military load, night flying commencing with individual flights in vicinity of aerodrome and to progress to include formation flying and across-country flying by individuals and formations.

Aerobatics Required

In the training in the specialties of the different classes of aviation, pilots of pursuit aviation will be required to be able to perform barrel rolls (slow and fast), roll over top of loop, loop half-roll, and flying on back, to indulge in combat exercises which will include flight vs. flight, squadron vs. squadron, flight squadron and group vs. bombardment and attack formations. Pilots of observation aviation will be required to become proficient in visual communication, using signal pyrotechnics, drop and pick-up messages; in photography, requiring the making of pinpoint, oblique, strip and mosaic pictures; in artillery adjustments on the smoke puff range and in liaison exercises with infantry, cavalry, field artillery, and coast artillery troops involving the use of signal devices and radio. Attack aviation will be required to undergo progressive instruction which will include attacks against targets with smoke, machine guns and rifle bombs by flight squadron and group.

Ground instruction will be conducted in troop schools which will be established by each group or squadron. The scope of this instruction will include aerial gunnery, aircraft armament, radio, aerial navigation, oxygen equipment, engineering, administration and mess management, photography, military hygiene, military law, infantry, combat orders, chemical warfare, air tactics, field artillery, coast artillery, cavalry, and a familiarization with the salient features of characteristic types of naval craft.

Plan Air Tour Of Arkansas

LITTLE ROCK, ARK.—Plans for an all-Arkansas air tour are rapidly developing, according to a recent announcement here. A committee of 18 business men of this city has been appointed to take charge of the affairs of the tour which is planned to begin on September 24.

Among the members of this committee are Mr. Moorhead Wright, president of the Little Rock Chapter of the National Aeronautic Association, and Col. J. Carrol Cone, governor-at-large of the association, and commanding officer of the 154th Observation Squadron, Arkansas National Guard.

Omaha Ready for Canadians

OMAHA, NEB.—At a recent meeting of the aviation committee of the local chamber of commerce Chairman Thomas appointed Dr. D. T. Quigley, Louis Thoeleeke secretary of the local N. A. A. chapter; Hird Stryker of the Legion Airport, and F. E. Caldwell of the Boeing company to make the proper arrangements for servicing the planes that will land at the Municipal Airport on September 9 in the Windsor, Canada to Los Angeles race. A. H. Fetters was named director of the day's activities.

Plain Yacht—Flying Club

CINCINNATI, O.—Plans for the combination of a yacht and flying club with a clubhouse on the riverside airport were discussed recently at the opening of the Gallipolis, O., airport. Dr. Charles E. Holzer, after whom the airport is named and who headed the movement to obtain and establish the field, is an aviation and yachting enthusiast. The airport is on a field belonging to him.

Reviews

The Book Department Aviation 280 West 57th St., New York City can supply all books mentioned except government publications. N.A.C.A. publications may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

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National Advisory Committe for Aeronautics Report No. 285. A study of Wing Flutter (In three parts) by A. B. Zahm and R. M. Bear.

Part I, Vibration of MO-1 Tail Plane and Other Airfoils by R. M. Bear. It is chiefly a description of tests made in February, 1925', and later, for the Bureau of Aeronautics in the four foot by four foot wind tunnel of the C. and R. Aerodynamical Laboratory, Washington Navy Yard. From these tests are drawn conclusions as to the cause and cure of aerodynamic wing vibrations.

Part II. Theory of Oscillations of an Airfoil in Pitch and Roll by A. F. Zahm, derives stability criteria for wing vibrations in pitch and roll and gives design rules to obviate instability.

Part III. Design of spars for Equal Flexure by R. M. Bear. As the title implies, information is given as to how to design spars to flex equally under a given loading when given the wing plan and profile. By its use the minimum torsional rigidity of structure required to prevent flutter may be obtained with a maximum economy of material.

It is stated that resonant flutter is not likely to ensue from turbulence of airflow alone past wings and tail planes in usual flying conditions. To be flutterproof, a wing must be void of reversible autorotation and not have its centroid far aft of its pitching axis.

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Technical Note No. 187. Navy Department, Bureau of Aeronautics. The So-called "Dry Rot" Failures by Lieut. Lloyd Harrison (CC), U. S. N.

A number of samples of hardwoods said to have failed due to dry rot, were forwarded to the Forest Products Laboratory of the Department of Agriculture for examination. It was learned that a number of these failures were due to faulty wood (under weight or strength) or excessive loading rather than due to the growth of this specific fungus. As it is practically impossible to detect dry rot in its early stages, outside of the laboratory, it is recommended that the wood be protected by proper coatings and be kept free from continued exposure to warm humid atmosphere (such as exists in improperly ventilated packing boxes).

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TECHNICAL PUBLICATIONS RECEIVED

National Advisory Committee for Aeronautics Technical Memorandum No. 473. The Problem of Noise to Civil Aircraft and the Possibilities of Its Elimination Part II. By W. S. Tucker. From the Journal of the Royal Aeronautical Society for March, 1928.

AIRPORTS AND AIRLINES

T. A. T. Air-Rail Service Started

Operation Brings On Central West Section of Trans-Continental System

NEW YORK, N. Y.—Service over the central west section of the proposed Transcontinental Air Transport route was inaugurated September 1 when Mayor John M. Dahl, of Fargo, N. D., was carried over the route as a passenger from Fargo to New York. The new air rail service saves an entire business day on through trips between Eastern cities and points west of Minneapolis and St. Paul. It consists of an airline operating between Chicago and the twin cities and connecting at both terminals with through limited express trains to and from the East and West.

The westbound plane flies from Chicago to St. Paul in 4 hrs. and to Minneapolis in 4 hrs. and 10 min. Eastbound time is 3 hrs. and 40 min. from Minneapolis to Chicago and 3 hrs. and 30 min. from St. Paul to Chicago. The air line is operated by Northwest Airways Inc., a subsidiary of Transcontinental Air Transport, Inc., which was formed recently by the Pennsylvania Railroad, the Curtiss Aeroplane and Motor Co., the Wright Aeronautical Co. and banking interests.

Ford Planes Used

The Ford planes used between Chicago and the Twin Cities are powered with three 400 hp. Pratt & Whitney Wasp engines. The planes are capable of a top speed of approximately 140 m. p. h. and a cruising speed of 115 m. p. h. They carry twelve passengers, in addition to providing space for baggage. Large, comfortable chairs and an unobstructed view through the windows are attractive feature of the service. Plans for the new air-rail service were developed by the Technical Committee of Transcontinental Air Transport, Inc., headed by Col. Charles A. Lindbergh, chairman, who is also consulting aeronautical engineer of the Pennsylvania Railroad.

Passengers traveling from New York, Philadelphia, Baltimore and Washington to the Twin Cities and the Pacific Northwest who desire to use the new airplane service from Chicago to St. Paul and Minneapolis will leave New York on the Pennsylvania Railroad's "Manhattan Limited" at 6:15 P. M. (Eastern Standard Time), North Philadelphia 8:05 P. M., Washington at 7:05 P. M. and Baltimore at 8:02 P. M., arriving at Englewood Station, Chicago, 1:40 P. M. (Central Standard Time) and Union Station, Chicago 2:05 P. M. the following day.

Connecting airplanes leave Cicero Field, Chicago, at 3 P. M., arriving at St. Paul at 7 P. M. and Minneapolis at 7:10 P. M. At the Twin Cities convenient connections can be made with the evening limited trains of all railroads to the Northwest.

Eastbound planes leave Minneapolis at 8:30 A. M. and St. Paul at 8:40 A. M., following the arriving of morning limited trains from the West, and reach Cicero Field at 12:01 P. M. Passengers for Philadelphia and New York leave Chicago, at Englewood Station, on the Pennsylvania Railroad's "Broadway Limited," at 12:57 P. M. (Central Standard Time), arriving at North Philadelphia at 7:54 A.M. and New York at 9:40 A. M. (Eastern Standard Time). The "Liberty Limited," leaving Union Station, Chicago, at 1:10 P. M. and Englewood Station at 1:27 P. M., arriving at Baltimore at 8:03 A. M. and Washington at 9:00 A. M., affords an ideal connection for Baltimore and Washington passengers.

"Standing By"

Torpedo planes of Squadron VT 23 standing by for inspection at the naval air station San Diego, Calif

Improving Bader Field

ATLANTIC CITY, N. J.—According to an announcement made recently by Mayor Ruffu, improvement of Bader Field is to be more extensive than it was originally intended. Following a conference with contractors it was decided to have a larger landing space than previously planned.

Passenger Ticket Center in Chicago

Reservations to All Points in U. S. Can Be Made at New Office

CHICAGO, ILL.—Reservations to any part of the United States served by air mail passenger planes will be handled beginning today (September 8) at the Air Travel Bureau and Consolidated Ticket Office which will be established in the Palmer House by the Chicago Air Traffic Association. Complete service, including transportation to airports and arrangement for hotel accommodations en route, will be rendered by the new organization. This was made public recently in an announcement of Thomas Wolfe, Jr., president of the association and division traffic manager of National Air Transport, Inc.

An elaborate waiting room has been provided where air passengers can enjoy every comfort. Complete time tables on railroad connections and air line operations throughout the United States and Europe can be found at this station. Attendants under the supervision of Robert L. Woodcock, manager of the passenger bureau, will be on hand from early morning until 9 o'clock each evening to make reservations.

Leading Firms Included

Members of the Air Traffic Association include National Air Transport, Inc.; Northwest Airways, Inc.; Embry Riddle Co.; Robertson Aircraft Corp., and the Boeing Air Transport, Inc. This group of companies operates a total of 6,160 mi. of airways, which is approximately 50 per cent. of the total of the air mail lines in the United States.

These same companies connect with all other air mail lines, which will make it possible at this office to secure air transport tickets to almost every point in the United States. These companies, all being air mail operators, have a proven background from the standpoint of safety in operations and the total mileage operated each day amounts to 15,210.

Sunday Flights Net $441

CEDAR RAPIDS, IA.—Pleasure flights on a recent Sunday brought $441 in the flying time of three and one half hours, according to Dan Hunter of Cedar Rapids Airways, who employed a Stinson plane in the work. The craft carried 147 passengers.

Cincinnati to Get Lunken Airport

Field to Become Part of Municipal System Comprising Nearly 1,000 Acres

CINCINNATI, O.—Officials of the Lunken Airport Company, proprietors of Cincinnati's municipal flying field, arranged on August 29 to transfer the port to the city. The directors authorized L. G. Pochat, treasurer, to sign the transfer with John D. Sage, president, in the event that Capt. John W. Pattison, secretary, refused to sign. Pattison and a small block of minority stockholders have persistently refused to sign the transfer, holding that the city should pay $43,000 for the field, this sum having been invested by the company in its development. Pattison said this money should be used in promoting airplane manufacture in Cincinnati.

The city is getting Lunken Airport, comprising more than 200 acres, without cost other than the assumption of pending obligations of the company, amounting to less than $5,000. The company decided on the transfer in order to promote local aviation as rapidly as possible. Lunken Airport will thus become part of a municipal airport system comprising nearly 1,000 acres. At the time of the steps for transfer the city was tabulating bids for diking and other improvements of the airport calculated to make it one of the finest.

Many Bid for Contract

C. O. Sherrill, city manager, announced that because of the keen competition of approximately 10 bidders the work would cost only about $120,000 instead of an estimated $140,000. The Embry-Riddle Co., a pioneer in aviation development in Cincinnati be permitted to lease quarters in the new administration building and hangars which the city will erect, in order to continue its activities unimpaired.

The city may also lease certain operating privileges to the highest bidder, renewable for certain periods, Sherrill intimated. It was also brought out at the meeting that the city is acquiring options on a few more acres in order to round out its field, and that it plans for the erection of administration buildings, hangars, shops and barracks for workmen, besides the improvements of the terrain.

Link Chicago-Philadelphia

CHICAGO, ILL.—A direct Chicago-Philadelphia air mail service has been begun by the N. A. T., with mail leaving Chicago at 7 P. M. arriving in Philadelphia at 5:35 A. M. the following morning. Chicago mail is scheduled to arrive in Philadelphia in time to meet planes from New York and points south as far as Atlanta, Ga. Mail servire of 24 hr. from Chicago to Virginia, North Carolina, South Carolina, and other southerly points results.

Pilot Yourself Plane Appears

WICHITA, KAN.—The Wichita Air Service Provision Co. is offering a new aeronautical service, one little known now but which is destined to become popular within a few years.

Any accomplished flier whose abilities are known to Charles Lander, operations manager of the company, can rent a "driverless" machine of the company in the future. Its hangars are on the airport. "Driverless automobiles can be procured anywhere in the country," says Lander, "so why not driverless airplanes."

Field Near Asheville To Be Among Finest

ASHEVILLE, N. C.—Newly opened the Asheville-Henderson Airport, lying between the two named cities, is to be one of the finest and best equipped in the south when complete. The two runways, a north-south and an east-west, both of more than 2,000 ft. in length, are capable of caring for any size plane. The field comprises a 160-acre tract recently purchased by T. J. Roberts of Asheville for $50,000.

Mr. Roberts, it is understood, plans to devote his entire time to the development of air passenger and freight service. Plans are now under way for the formation of a training school and flying club.

Among those who took part in the recent dedication rerememes were F. A. Stone of Atlanta stunt pilot, Miss Mabel Cody, Paramount Pictures stunt aviatrix; Jack McCullum, record parachute jumper; Dr. J. E. Owens, Asheville pilot, Douglas Davis who holds a speed flying record, and Curley Burns, manager of Candler Field, Atlanta.

Plan Large Mail Load

SACRAMENTO, CALIF.—Largest of single commercial air mail deliveries from the West Coast is to be made from here September 30, it is said, when letters are sent to some 20,000 schools in the United States and Canada announcing the final results of the International Typewriting Contest, which will close the preceding evening.

Emergency Field for Winona

WINONA, MINN.—An emergency landing field is to be established here by the Government, this city being on the line of the Twin Cities-Chicago route. A beacon light is to be installed at the apex of a 50-foot steel tower.

Operating Firms Now Number 26

Statistics Show 32 Airways With Planes Flying 31,240 mi. Daily

WASHINGTON, D. C.—According to figures made public by the Department of Commerce the 25th anniversary of flying August 15, 1928, found 26 companies in the United States which were operating 32 airways over 13,131 mi. with planes flying 31,240 mi. daily. In addition to this the figures showed the present airway mileage will soon be increased to 15,869 mi., when 2,738 mi. now scheduled come into operation. Of this total 14,502 mi. will be air mail lines, as compared with 11,764 mi. of mail lines now operating.

While previous statistics for all air ways are not now available the Department figures show that from a total of 218 mi. in air mail routes Dec. 31, 1918, the mail routes increased to 2,842 mi. on Mar. 31, 1928, and 11,764 mi. on Aug. 15, 1928.

On the 25th anniversary of flights, the Department said, the airways in operation covered 13,131 mi., while on the 25th anniversary of the railroads in 1850, there were only 9,021 mi. of railroad in the United States.

4,898 Pilots Now Licensed

There are now 4,898 licensed pilots in the United States Airplanes licensed number 5,816, while there are 67 airplane and 6 engine models which have been approved by the Department of Commerce. These, the Department stated, paid returns of 26.08 per cent. on their investment. The total value of all air products has increased from $14,372,643 in 1919 to $21,161,853 at this time. In 1927 the United States produced 1,995 planes valued at $14,504,999.

In the first six months of 1928 internal lines of the United States carried under contract 1,278,940 lb. of mail for which they were paid $2,326,400. Total expenditures by the Post Office Department on air mail from 1918 to 1928 amounted to $18,924,076.

Lighted mileage of mail airways totaled 7,089 mi. on June 30 1928, with 1910 additional miles of airways equipped with intermediate fields and markers for safe flying.

New Barracks for Sand Point

SEATTLE, WASH.—Work has begun on the new barracks to be constructed at Sand Point Naval Air Station here at a cost of $225,000. The barracks will provide accommodations for the enlisted personnel of the station.

Ground clearing is under way, blasting operations being used to clear the site of stumps. As soon as this work is completed the foundations will be laid.

Move to Unify Nations' Fields

Aero Chamber Organizes Airport Section to Standardize Rules and Services

NEW YORK, N. Y.—A movement to band the commercial airports of the nation into one great unit for the standardization of rules and service has been begun by the Aeronautical Chamber of Commerce with the organization of the Airport Section of that group. A national committee was appointed to complete the detailed organization throughout the country at a recent conference attended by field managers, engineers, operators, and manufacturers of airport equipment held at the Chamber's headquarters here.

Maj. John Berry, manager of the Cleveland Airport and formerly chief engineer of the U. S. Air Mail Service, was elected chairman, and Clarence A. Chamberlin, consulting aeronautical engineer of New York City, was elected vice chairman of a committee which includes the following: W. E. LaFollette, manager, Los Angeles Municipal Airport; F. B. Hegardt, manager, Oakland Municipal Airport; J. A. Casey, manager, Chicago Municipal Airport; Francis J. Geng, manager, St. Paul Municipal Airport; Maj. A. B. Lambert, manager, St. Louis Municipal Airport; R. S. Saltus, menager, Philadelphia Municipal Airport; Gardner Fisk, chairman, Boston Airport Committee; W. B. Hartzfeld, manager, Atlanta Municipal Airport; H. Fiarh, manager, Salt Lake City Municipal Airport; Stedman Hanks, president, American Airports Corp.; New York City (Engineering), W. J. Austin, president, Austin Company, Cleveland (Construction); C. S. "Casey" Jones, Curtiss Flying Field Service (Operation), New York; W. W. Kellett of the B. B. T. Corp. (Equipment), Philadelphia; and Howard C. Knotts, Springfield, Ill.

Colonel Driggs Presides

Col. L. L. Driggs, vice president, Colonial Air Trausport, acted as temporary Chairman of the meeting.

"In the last year the number of airports has increased from 400 to 500 to over 1,200," said Maj. Berry. "Although the Department of Commerce has done its best to lay down primary rules for the guidance of airports, the overwhelming necessity for self-regulation due to local conditions has arisen. Recognition of this fact led airport managers and manufacturers of airport equipment to request the Aeronautical Chamber of Commerce to call a preliminary conference for the consideration of an organization program.

"The complications of air transport in the United States are almost inconceivable," added Maj. Berry. "One of the first problems that the commercial aviation industry must work out is that of properly handling passengers on flying fields. Another vital question has to do with uniformity in illuminating fields for night operations. Our section proposes to work out, in harmony, of course, with the Department of Commerce, a uniform system governing beacons, flood lights, and the identification of approaches, hazards, etc."

Another meeting of the section will be held in Los Angeles during the air races in September, and in December during the International Aeronautical Exposition in Chicago, a National Airport Conference will be held under the auspices of the Aeronautical Chamber of Commerce.

Will Add 350 Acres To Agawam Airport

HOLYOKE, MASS.—An addition of 350 acres of land to the Agawam Airport is to be made, according to Congressman Henry Bowles, head of the Agawam Airport, Inc. A large force of men will be detailed to work on the field, after the deeds are passed and bids accepted.

Airport experts place unqualified approval on the site and pronounce the field to be one of the finest in the section. Only permanent buildings will be constructed, according to the plans of the company, as every structure will be built with an eye to future development.

The modern hangar to be erected will have a storage capacity of eight planes in addition to a machine shop operations quarters, and a control tower to command a view of the whole field. The principal landing field will be an all-way circle with a diameter of 2500 ft. and other strips when prepared will give a runway of more than 4000 ft.

Braley School to Have New $20,000 Building

WICHITA, KAN.—Ted Braley, head of the Braley Flying School, announces plans for a $20,000 building to house his school on the municipal airport here. The main building will serve as a hangar for 15 planes and will include class rooms and a well-equipped machine shop. Two additions, one for office quarters and the other for an experimental room, will be built.

More than 100 students are now enrolled in the Braley school. The company has just accepted delivery on the first of 10 new Travel Airs being purchased for instruction purposes.

Ship-Shore Mail to Boston

BOSTON, MASS.—In order to test Boston as a ship-to-shore mail port, the French Line's Liore et Olivier flying boat was catapulted from the *Ile de France* early in the morning of September 3, while the liner was still 300 mi. off Halifax and 900 mi. from New York, and flown to this city by Lieut. Louis Demougeot. A Boston mail time saving of 36 hr. resulted, with the plane arriving at this port 24 hr. ahead of the scheduled docking time in New York.

N. Y. C. Air-Rail Line Opening Is Scheduled

CHICAGO ILL.—With the coordinated service of Universal Air Lines and the New York Central Railroad, which is to begin to-day (September 8) it will be possible for Chicago business men to leave this city at 5:20 P. M. and arrive in New York at 9:50 A. M. the next day. Announcement of this new daily service was made recently by P. G. Kemp, president and general manager of Universal Air Lines.

The saving in time is effected by the operation of two seven passenger Hamilton Metalplanes, having a cruising speed of 120 m. p. h., in shuttle service over a 321 mi. route between Chicago and Cleveland, where the planes will make connections with the Southwestern Limited train of the New York Central line. Westbound passengers leaving New York at 6 P. M. will be met at the train in Cleveland and conveyed to the airport where they will board a plane for Chicago, arriving there at 8.45 A. M. At Chicago passengers bound for St. Paul and Minneapolis will be able to make connections with Northwest Airways planes with a considerable saving in time. Two auxiliary lines connect the Twin Cities with Fargo, N. D., and Duluth.

Air reservations may be made through railroad ticket agents or at the flying fields and each passenger is permitted 25 lb. of baggage.

Three Nations Line Operating On Coast

LOS ANGELES, CALIF.—A three-flag passenger airway is now in operation along the Pacific Coast as the result of a recent co-operative agreement reached between Union Air Lines, Inc., Pickwick Airways, and Maddux Airlines of Los Angeles. More than 1,000 offices and ticket agencies along the Pacific Coast have announced the new service and are handling passenger reservations for the trip.

The new service provides through connections from Vancouver, British Columbia, to Agua Caliente, Mexico, by way of Seattle, Portland, San Francisco, Fresno, Bakersfield, Los Angeles and San Diego. Tri-engined planes are used over the entire route; Bach monoplanes being employed over the northern portion, and Ford cabin planes over the southern half of the route.

Omaha Field Gets Lights

OMAHA, NEB.—Commissioner Dean Noyes of the city has placed two large flood lights of 4,000 watt capacity each on the Municipal Airport here. He made the announcement that these were only temporary and that his department must have $7,000 more to correctly complete the field. Water has been piped in and a service station established.

To Lease Public Land In West for Airports

WASHINGTON, D. C.—Announcement is made by the Secretary of the Interior that all of that department's public land in Western States so far unreserved and unappropriated will be leased to individuals, corporations and municipalities as aviation fields in order to encourage flying on a transcontinental scale.

Under a recent act of Congress, Secretary West of the Interior Department and Assistant Secretary of Commerce McCracken have drafted regulations covering the leasing of tracts up to 650 acres area for 20 yrs. A fee of $10 a year will be required.

It is provided in these regulations that the fields so leased must be maintained in keeping with requirements of the Department of Commerce particularly regarding fuel, lights and other facilities. Lessees will have six months in which to equip the fields and if at any time in the judgment of the Department of Commerce they are not being properly maintained these leases may be cancelled. The government may take over the airports in case of war and to have free and unlimited use of the fields in this contingency.

Coolidge Field in Wisconsin

SUPERIOR, WIS.—The air field at Parkland will be made a permanent institution and named Coolidge field as a result of recent action.

Makes Perfect Safety Record

LOS ANGELES, CALIF.—The Aero Corporation of Calif., operating the Los Angeles-Phoenix-Tucson air lines and a local taxi service, announces a total of 11,989 paid passengers carried between January 1 and Aug. 15 1928, without injury to anyone.

At a recent re-election of officers held by the directors of the corporation, Jack Frye was retained as president, Paul E. Richter, Jr., as treasurer, and E. R. Chisolm as secretary. Walter A. Hamilton was elected vice president in charge of operations.

The corporation recently took over the distributorship for Hamilton propellers in California and Arizona. The company now carries a complete stock of steel and wood propellers.

Lights for Empire Airway

CINCINNATI, O.—According to word recently received, the Empire Airway between Cincinnati and Chicago will be lighted by the Department of Commerce. In this decision the Department reverses its former intention of lighting only the Cincinnati-Indianapolis section of the route.

Orlando Airport Opening Planned

Army and Marine Planes to Participate at Dedication on October 4-5

ORLANDO, FLA.—Dedication ceremonies will take place at the Orlando Airport on Ortober 4 and 5. Assurance has been made that a number of Army planes will be present, and Gen. John A. Le Jeune, commander of the U. S. Marines, announces that a flight of Marine planes will also be sent. The Municipal Airport hangar, now under construction, will be completed before the dedication.

In addition to the field exercises the celebration will include a banquet at the city auditorium and a ball at the Coliseum at which pilots and other visitors will be guests of honor. Clay Bimen, chairman of the stunts committee, has many activities planned. Secretary Clarence Gay of the local chamber of commerce is negotiating to have the dirigible Los Angeles present at the dedication.

The new airport, to cost, including hangar, approximately $250,000, is 2,600 feet in length and 2,000 feet in width. It lies less than two miles from the center of the city and may be reached by three paved roads. The airport committee is made up of Mayor L. M. Autrey, Lieut. E. C. Nilson, pilot, and Morton Macartney, city engineer.

Air Mail Line Statistics for July

Route Number and Termini	Length of Route (Miles)	Frequency (Round trips per month Scheduled)	Miles of Service—Scheduled	Miles of Service—Actually Flown	Total Weight of Mails Dispatched (Pounds)	Amount Paid to Contractor
1. Boston-New York	192	25	9 600	8,348	3,106	$ 9,317.62
2. Chicago-St. Louis	278	20½	11,398	11 398	3,112	7,875.98
3. Chicago-Dallas (Night)	1,059(c)	31	65 658	65,658		
3. Chicago-Kansas City (Day)	461	31	28,582	28 582	14 655	43,964 53
4. Salt Lake City-Los Angeles	600	31	37,200	36,625	22 838	68,514 56
5. Salt Lake City-Pasco	530	31	32 860	32,860	7,905	23,714 81
6. Detroit-Cleveland	91	15	2,370	1,748	91(b)	96 21
7. Detroit-Chicago	237	12	5,688	5 688	680(b)	734 74
8. Seattle-Los Angeles	1,099	26	53,170(a)	53,017	8 907	25,270.11
9. Chicago-Minneapolis	383	21½	16,469	16,469	3,795	10 436 16
11. Cleveland-Pittsburgh	123	31	7,626	7,626	3,390	10,170 56
12. Cheyenne-Pueblo	199	31	12,338	12 338	4,245	3,523.30
17. New York-Chicago	772	62	91,840	87,815	55,752	65,108 08
18. Chicago-San Francisco	1,918	31	118,916	118 916		
18. Chicago-Lincoln (d)	483	16	15,456	15 456	60 949	126 815 99
19. New York-Atlanta	763	25	38,150	36,058	6,476	19,428.00
20. Albany-Cleveland	446	26	23,192	22,422	3 442	3 820 48
21. Dallas-Galveston	320	31	19 840	19 570	1,970	9,694 56
22. Dallas-San Antonio	287	31	17,794	17,182	2,732	7,895 84
23. Atlanta-New Orleans	483	25	24,150	23,477	2,235	3,910 92
24. Chicago-Cincinnati	270	31	16,740	16,740	2,691	3,955 36
26. Great Falls-Salt Lake City	493	None	None	None	None	None
27. Bay City-Chicago	534	15	16,020	15,890	5,387	4,972.62
Totals	12,021	599	665,057	653,883	214,558	$445,220 43

(a) Southbound trip not operated from Seattle to Portland. (b) Net weight only. (c) Service on Tulsa Ponca City spur inaugurated July 5, 1928. (d) Service inaugurated July 10, 1928. Route 6 was discontinued July 19, 1928, Route 7 was discontinued July 16, 1928, and Route 27 was established July 17, 1928.

FOREIGN ACTIVITIES

Aircraft Exhibit Is Held in Italy

Most Recent Plane and Engine Developments Shown at Milan Salon

MILAN, ITALY—A number of interesting airplanes and engines were displayed recently at the Milan Aeronautical Salon and although there were fewer exhibits than last year, many of the displays are worthy of note.

The exhibit of S A Aronne, Cantieri Aeronautici Bergamaschi, which in addition to a pilots' school, has an aeronautical plant reported to be well equipped, consisted of two training planes of recent type, a monoplane, C.I. and a biplane, C 1, both models having been designed by Ing. C M Calligaris. Both are powered with 150-180 hp Hispano Suiza 34 engines. The exhibit of this firm was supplemented by a number of photographs of the Ponte S. Pietro aviation field and machines, and by graphic descriptions of their pilot school activities.

Breda Planes Exhibited

The Aeronautica Breda exhibited its training plane, the Breda 8 bis Model, and two other Breda planes of the training type in which this firm specializes. This firm also exhibited two planes with variable seating arrangements, the Breda A4 with side by side and Breda A9 with tandem seats.

A conspicuous place was occupied by the Isotta Fraschini engines. The range of the famous Asso power plants were exhibited beginning with the small 200 hp Asso engine with cylinders in line. The Asso 450 pursuit engine of 450 hp is the latest adjunct to the products of this firm. The cylinders are in the form of a "V" on two lines and are air cooled. Next came the normal Asso 500 engine used in the Santa Maria trans-oceanic flight, during the Maddalena flight, and also for the Passaleva record establishing flights. Another interesting model exhibited was the Asso 500 "reducer" model, especially designed for planes carrying heavy loads with limited speed. The most imposing model exhibited was the Asso 1000 Model. This engine is reported to have passed official tests carried out in the presence of aeronautical engineering officials, and will shortly undergo also, an official endurance test.

Engine Has Six Carburetors

The engine, with its 18 cylinders in board arrow arrangement, develops 900 hp at 1,500 r.p.m., 1,000 hp at 1,600 r.p.m., the normal speed and 1,100 hp at 1,750 r.p.m. It has six carburetors. The lubrication is accomplished by pump for the circulation of the oil by pressure, while two pumps of a like type are carried for oil recovery.

A portion of the Isotta Fraschini Booth at the Milan Salon. The broad arrow type engine beneath the propeller is the new Asso 18 cylinder, 1000 hp engine.

Landing Field Adjoins Hotel

OXFORD, ENGLAND—A hotel known as "The Dog House" adjoining Frilford Golf Course here possesses a large field, it is announced, suitable for the landing of light airplanes. Mr. Chandler, the proprietor, states that his hostelry is ready to extend special welcome to those flying in the vicinity. In mentioning the new hotel service, "The Aeroplane," leading British aeronautical publication, suggests that "those who are Mothing, Avianating, Bluebirding, Widgeoning, Imping, or Spartaning" take note.

Mexican Aero Group Opens Aviation School

MEXICO CITY, MEXICO.—An aviation school with 313 students, including 20 women has been opened here sponsored by the Mexican Aeronautical Association. The School of Mines, centrally located in the city, was chosen for the classes.

The following courses will be given. In the school: airplanes, meteorology, navigation, radio, mathematics, legislation and aeronautical regulations, and engines. Students will be divided into two groups for instruction purposes. The purpose of the school is to train a competent body of civil pilots for commercial aeronautics.

The school was formally opened by Engineer Eduardo Hay, sub-secretary of Communications and honorary president of the Mexican Aeronautical Association. Engineer Juan Guillermo Villasana, president of the Mexican Aeronautical Association, and chief of the Bureau of Civil Aeronautics, made the opening address.

British Group to Map City of Rio de Janeiro

RIO DE JANEIRO, BRAZIL.—Au aim to make Rio de Janeiro one of the best mapped communities in the world has been divulged by the Pan American Union. An expedition of aerial photographers has been engaged in London to make a highly detailed air map of the city, and according to the nature of the contract several years will be required for the completion of the task.

Already a party of 15 experienced pilots, photographers and assistants has arrived in the Brazilian capital. Additional scientific assistants will be obtained locally, according to Col. T. T. Behrens of the Royal engineers of England, who is in charge of the work. Colonel Behrens has had long experience in this class of work in numerous British possessions.

Various types of airplanes are to be used in the work. Moth and Vickers planes have already been secured, it is reported.

Stinsons for Peruvian Line

LIMA, PERU.—Two Stinson-Detroiter six place monoplanes have been shipped to Elmer J. Faucett of this city. Mr. Faucett expects to operate a regular passenger and mail line between Lima and the City of Talara, Northern Peru, lying at a distance of 600 mi.

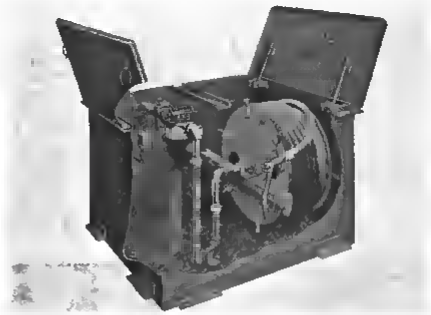
THE BUYER'S LOG BOOK

Bowser Fueling System

A SYSTEM which permits fueling from the most convenient point on the field and provides fast and accurate gasoline service without ground or fire hazard, is being manufactured by S. F. Bowser & Co., Inc., Fort Wayne, Ind. The compact fueling unit is built into a substantial welded metal box or pit which is so installed that the top is flush with the surface of the field. Heavy water tight covers, fitted with lifting rings give a solid top to the pit, permitting planes to taxi across it if necessary.

The fueling unit consists of a large reel with 50 ft of kinkless gasoline hose, providing a circular fueling area 100 ft. in diameter, a vapor-proof switch for remote control of the unit, and a Bowser Xacto meter on the discharge line. All piping is complete inside the pit which is furnished as a unit ready to install and it is only necessary to connect gasoline line and conduit pipe to the outside of the pit box when making the installation. On larger fields the same pumping unit can be made to serve one or two additional pits.

Gasoline flow is controlled at the nozzle preventing overflowing at the gasoline tank and a tip is provided to keep dirt and water out of the nozzle. By the use of these units, clean, filtered gasoline is available in any quantity at a speed of 18 to 20 gal. per min. The pit can be easily removed and installed in a new location.



Bowser fueling pit with sides broken away to show hose reel, Xacto meter and piping

Improved Wind Cone

AN IMPROVED type of wind cone which indicates direction, velocity and condition of wind and can be electrically lighted, has been developed by the Heath Airplane Co., of Chicago, Ill. The Non-Fouling Airport Wind Indicator, as it is called by the manufacturers, is the result of 15 years of experimentation.

The outstanding departure from the old type of wind cone is found in the mounting. Instead of being mounted rigidly to the mast, the large hoop is attached to a swivel on the mast by means of shrouds, leaving the cone free to indicate the velocity and wind conditions. This also makes fouling impossible, as the hoop rolls against the mast in a dead wind. After a short experience with this type of cone a pilot is enabled to judge the wind velocity by noting the angle which the cone makes with the mast.

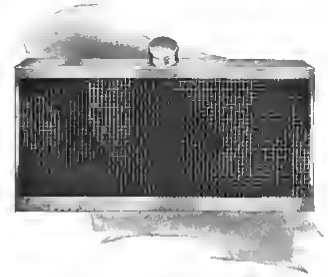
The lighted type of cone is equipped with a small but powerful searchlight placed at the meeting point of the shrouds so that the beam follows the cone and passes through it. Thus the angle of the beam indicates the wind velocity at night. Surface conditions are indicated by the oscillation of the beam.

These wind indicators are made in three sizes, the largest of which is 12 ft. long, 3 ft. in diameter and has 6 ft. shrouds. The medium size cone is 8 ft. long, 2 ft. in diameter and has 4 ft. shrouds and the small type is 4 ft. long, 1 ft. in diameter and has 2 ft. shrouds. The two larger sizes can be furnished with electric lights for any specified voltage. The regular equipment includes a 12 in. nipple with swivel on the top and coupling on the bottom end so that the cone can be quickly screwed on a standard 1 in pipe mast. Unbleached, weather resisting fabric and cadmium plates hoops are used, contributing to the long life of the cone and renewals can be purchased separately.

G. & O. Radiators

A NUMBER of aircraft manufacturers are using radiators produced by the G. & O. Manufacturing Co. of New Haven, Conn. These products are light and highly efficient units for water cooled installations and have been widely used by the Army and Navy Departments and in the air mail service. It was this type of radiator which was used on the NC planes that first crossed the Atlantic.

Fittings for G. & O. radiators are either of seamless copper or brass tubing or bronze castings. The tanks and cores are of special bronze composition. These bronze compositions are stronger than the ordinary high brass used in the average automobile radiator. They are also tougher and stronger than copper but have the same resistance to corrosion as copper.



One type of G. & O. Radiator

Dartmouth Tex Aero Cloth

DARTMOUTH TEX Aero Cloth has been manufactured to Army and Navy specifications for more than ten years by the Thurston Cutting Corp, 116-118 Franklin St, New York City. Large stocks are carried by the company at all times and samples and quotations will be furnished on request.

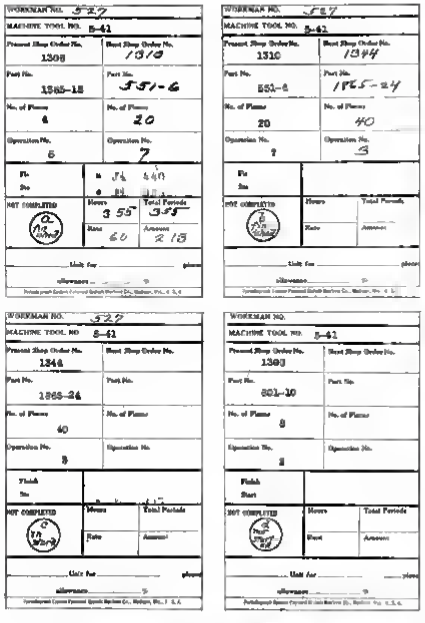
Grade A Aero Cloth is a mercerized, full count, 36 in. width fabric for wing, empennage and fuselage covering and is not a processed fabric. It is put up on convenient rolls to insure against creases and wrinkles and in any yardage up to 600 yd per roll.

Dartmouth Tex will withstand unfavorable weather conditions because of the high grade of cotton used in the fabric. The company also manufactures tapes of all kinds including surface tapes and pinks (scallops) of any required size.

Labor Tickets, Their Forms and Uses

(*Continued from page* 815)

quently from one job to another, it is almost impossible to get a correct report of their time distribution on these blanket tickets. For accurate cost and production control, tickets similar in general to numbers four, five, six, seven, or eight should be used.



Form 8-(a) (b) (c) (d). These tickets when filled out provide information for the time keeping department.

Explanation now has been given of what is meant by planning production, scheduling orders and dispatching work to the machines. The forms of specifications, charts and tickets most suitable for this have been illustrated and discussed.

The means of controlling materials purchased from outside, and kept in stock, will be taken up by the author in another article, which will appear in an early issue.

The Goodyear "Puritan"

(*Continued from page* 813)

addition to providing means of testing various constructional improvements materials and parts it was built as a passenger air yacht. Every provision for the comfort of passengers in flight has been provided. The enclosed cabin, with its many windows, gives an unobstructed view of the land below, and makes flying possibly in extremely bad weather. Dual controls are provided for training purposes.

The Puritan was christened by Mrs. Howard Hyde of Cleveland, Ohio, daughter of Paul W. Litchfield, president of the Goodyear Tire & Rubber Co., who broke a bottle of liquid air over the cabin rail. The ship will be stationed at the Wingfoot Lake air station of the Goodyear-Zeppelin Corp., and Jack Boettner will act as chief pilot.

The launching of the Puritan creates at Akron the country's only "fleet" of airships, because it and the Pilgrim are both to be operated there. The baby dirigibles are interesting outside of engineering circles because they are of conceivable commercial value, and are small enough

A view of duralumin girder construction used in the cabin of the "Puritan"

to be within the reach of private owners. Operation of the Pilgrim, world's smallest dirigible which recently celebrated its third birthday, has revealed that ships of this type have a high degree of endurance, can be used as carriers of light express goods, provide a means of air travel not found in any other type of machine, and are remarkable in many other ways.

The Pilgrim was built by the Goodyear Tire & Rubber Co. as a purely experimental non-rigid airship of the "sport" type, and was launched June 3, 1925. Since that time it has been used in a great many unusual ways, and has successfully accomplished numerous difficult flights. Its log shows a total of approximately 325 actual flying hours, during which time it covered about 10,000 mi.

Operation of the tiny dirigible has shown that, under certain conditions, such a craft would be commercially useful, although it is somewhat more expensive to operate than an airplane of the same load-carrying capacity. The Pilgrim, although it was primarily designed as a passenger craft, can be used for the carrying of light express material. Its useful load is 890 lb. As an instance of such use, it might conceivably be employed for short hauls between a city airport and the downtown business section, its value in this instance being due to its ability to land and take off in a restricted area, such as the roof of a building.

During its period of operation, the Pilgrim has been taken on numerous cross-country flights, some of them to distant points. One of its most difficult feats was the carrying of a passenger from the Wingfoot Lake air station near Akron to the roof of an Akron department store building in the downtown section. The feat was accomplished without difficulty.

At another time the Pilgrim acted as a floating broadcasting station carrying Graham McNamee, well-known radio announcer. McNamee flew over Akron in the ship and talked to listeners below through a short-wave transmitter whose signals were in turn re-broadcast through radio station WADC of Akron. This experiment demonstrated that a craft of this type would be useful for directing activities over a large area, such as the making of a moving picture or the fighting of a battle.

For photographic work the Pilgrim far out-performs the airplane for certain types of exposures. It can hover at an almost fixed point for an indefinite period, making possible the "shooting" of as many pictures as desired at a slow speed if necessary.

One Christmas it acted as a modern vehicle for Santa Claus, flying over the Summit County Children's home at Akron, while presents were dropped to the youngsters below. In addition to these rather unusual jobs, the ship has acted as a training dirigible for pilots. Then, too, in all of its activities it has served its primary purpose as a flying laboratory. Engineers have kept close watch on all phases of its performance, and from the data collected have learned many valuable facts which undoubtedly will influence the future building of non-rigid and Zeppelin type airships.

The Pilgrim received its title of the "world's smallest dirigible" by virtue of its being but one-fiftieth the size of the "Los Angeles." It has a capacity of 53,000 cu. ft. of helium, the gas being contained in a single-cell bag partly held in shape by a metal keel. This keel is a duralumin girder of triangular section, 25 ft. long and weighs 30 lbs. The passenger and engine car is suspended to the keel by very short wires which enable perfect adjustment and provide great rigidity. The envelope is 105 ft. long and 31 ft. 6 in. in diameter. A ballonet, located with its center of volume over the center of pressure, permits adjustment of the bag capacity to compensate for variations in the helium volume, without necessitating the valving of helium. A similar arrangement is used in the Puritan.

Rear view of the cabin of the "Puritan"

A view of the tail unit of the "Puritan," showing the vertical rudders above and below

The three-cylinder Wright radial engine developing 60 hp. has never had a major overhauling since it was installed on the Pilgrim prior to the initial flight. The engine is mounted so that it can be reached from the rear of the cabin for adjusting. A four-blade aluminum propeller is used. This power plant gives the ship a speed of 51 m.p.h. on a fuel consumption of 4.6 gal. per hour. The gasoline tank carried 32 gals.

Maximum operating efficiency has not been reached at all times with the Pilgrim because of the absence of helium purifying and compressing facilities, engineers have pointed out. The gas, due to unavoidable natural seepage through the bag, becomes mixed with air so that its purity gradually grows less with a corresponding decrease in lifting power. The last filling of helium in the Pilgrim has been in use for about 18 months with new gas being added from time to time. With a compressing system, which would be necessary if the ship were in commercial use, the gas could be re-bottled and sent to a helium purifying plant for treatment. In this way

the ship's efficiency would be maintained at a high point.

The Pilgrim and Puritan are direct descendents of the smaller "Pony Blimp" built in 1919 at Akron. The first ship had a gas capacity of but 35,000 cu. ft., and was flown with hydrogen. It was the first passenger-carrying airship operating on regular schedule over a predestined route in the United States, being used for a long time on passenger service between Goodyear Field at Los Angeles and the Catalina Islands, 0 mi. away. The trip was a delightful one over land and water. In addition, the Pony Blimp was used for spotting schools of fish and whales, for motion picture photographic work, and for United States geographic survey work. It was eventually dismantled after having been completely worn out.

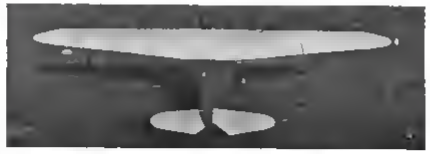
A noteworthy fact in connection with the operation of midget dirigibles is their high degree of safety. During the long periods of activity of the Pony Blimp and the Pilgrim, no accident occurred and no one was injured.

The "Kari-Keen Coupe"

(*Continued from page* 812)

stabilizer to the fin and the lower part of the fuselage respectively. As the plane is comparatively long, the tail surfaces have been so designed as to minimize over control due to the leverage obtainable and at the same time they respond readily to the action of the controls.

The fuselage is built up of welded steel tube construction, a Pratt type truss being used. The pyralin windshield has been so designed as to furnish good visibility in all directions and narrow pillars have been used to cut down the obstructed view as much as possible. The 36 in.



Rear view of the new "Kari Keen Coupe"

wide door with a 14½ in. x 30 in. glass opening resembles that of a modern automobile in construction, with the lock in the nickel plated outside handle and a crank within for raising the window. The fuselage is trussed to take care of the door opening, which allows ample room for entry or exit. It is noticeable that precautions have been taken to make the cabin as restful for travel as possible for it is wind and rain tight and there is a possibility of carrying on a conversation without a strain when the windows are closed. The interior of the cabin as well as the removable back rest and the spring cushion is luxuriously upholstered in mohair, making it seem as rich in appearance as the modern closed automobile.

The 38 in. wide seat affords plenty of elbow room for two and three is ample leg room so the pilot and passenger can travel in comfort on the deep cushions during long trips. To the rear of the seat is a luggage compartment, which will accomodate two bags and small packages. The door handles, control levers, window lifts and all interior fittings have been nickel plated so as to be in harmony with the rest of the interior arrangement of the coupe. On the instrument board are the necessary switches and a Consolidated panel with the instruments

required by the Department of Commerce is regular equipment.

All of the controls, including that for the rudder, elevator and the ailerons are actuated by push rods, no cables nor pulleys being used and thus positive action is assured whenever desired. The dual stick control can be readily disconnected and the pedals which are of the T type with

Front view of the "Kari-Keen" Coupe

a short bar for the foot rest, can be also disconnected and made to lie on the floor and thus be out of the way. Rocker arms are used so when one pedal is depressed the other will be pushed towards the pilot, ready to be used as needed.

The first Kari-Keen coupe was christened during Aviation Week in Sioux City by Miss Ethel Mae Frette of Des Moines, Ia. ("Miss Iowa") and a banquet at that time was also held at the Chamber of Commerce in honor of the organization, which is the first in the state to produce a plane.

From trial flights by Swen Swanson and Cedric Hoskins at the Leeds Airport the following performance figures have resulted:

Performance with light load of 820 lb.

Maximum speed	110 m.p.h.
Cruising speed	90 m.p.h.
Landing speed	38 m.p.h.
Service ceiling	19,000 ft.
Absolute ceiling	21,600 ft.
Climb	1,040 f.p.m.

Performance with full load of 1130 lb.

Maximum speed	100 m.p.h.
Cruising speed	85 m.p.h.
Landing speed	45 m.p.h.
Service ceiling	13,000 ft.
Absolute ceiling	16,000 ft.
Climb	680 f.p.m.
Approximate gasoline consumption per hour	5 gal.

The general characteristics of the Kari-Keen coupe are:

Wing span	30 ft.
Chord, center of span	7 ft., 6 in.
Chord, tip of span	4 ft., 6 in.
Wing area, including ailerons	150 sq. ft.
Aileron area (total)	16 sq. ft.
Span of tail	8 ft.
Area of tail	20 sq. ft.
Length overall	22 ft.
Height overall	6 ft., 6 in.
Weight empty	650 lb.
Weight, fully loaded	1,130 lb.
Pay load	480 lb.
Wing loading, full load	7½ lb. per sq. ft.
Designed for a load factor of	8.
Gasoline	28 gal.

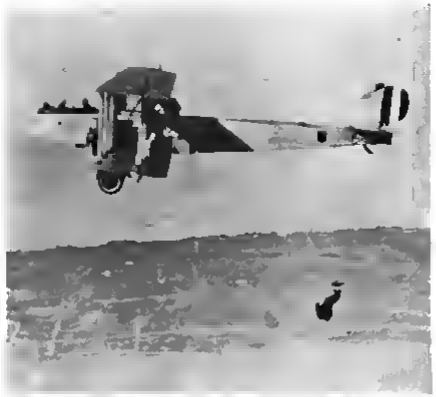
Powered by a 5 cylinder, 45 h.p. radial air cooled Velie engine.

Parachutes in Civil and Commercial Aviation

(*Continued from page* 811)

jumping, it is unable at this time, if it ever will be able, to promulgate a regulation calling upon the air transport companies to equip their passengers with parachutes. There is nothing in the Air Commerce Act requiring such protective measures for passengers, and no one so far in the Department has been able to find such a provision "in between the lines."

The fact is, that the Departmental officials believe the matter of equipping passengers with parachutes, as they exist, operate, and are known today, is entirely up to the air transport companies. These companies are going to institute every possible safety device. Those that succeed in this respect will profit in the long run. Hence,



Making a free jump from one of the Martin bombers operated by the U. S. Marine Corps. The jumper has not yet pulled the cord releasing the parachute from its pack

if the air transport companies find it is to their advantage to diminish the payload of the planes by taking on the increased weight of parachutes, they will do it without waiting for any suggestions, or orders from the Department of Commerce.

The general opinion held in the Aeronautics Branch of the Department on the subject of equipping passengers with parachutes, coincides with that expressed in France by a group of experts who have been delving into the general subject of "safety in flying." The French hold, that at the present stage of its development, the parachute, as a safety device, is of little value to an inexperienced person.

The man who flies frequently has it "doped out" just how he will use the parachute if the necessity arises. He has heard many times of the best method of operation, which has been supported by concrete examples. It is almost a question of instinct with him to jump from the plane and to pull the ring, but only after he has dropped a considerable distance away, in order to prevent fouling his parachute. The jumping is the hardest step, it is argued, and that is where it is felt that the difficulty lies in endeavoring to clear a ship filled with eight, ten or

twelve, or even fourteen persons, who perhaps are making their first flight

There are cases on record where passengers have been told to jump and have refused, preferring to take the crash. That places a great responsibility on the pilot, who knowing he can save himself by jumping, refuses to do so and tries to land a hopelessly disabled plane. A recently reported case, where the passengers refused to jump and met their deaths as the result, while the pilot saved himself with his parachute, serves to emphasize the contention of some that the parachute in general would be of little value to the air passenger.

Evacuating a large transport probably filled with women and children, as well as men, each of whom are equipped with a parachute, could not be accomplished as easily as the three engined Ford plane, flying at 2,000 ft. over Bolling Field was cleared by the nine experienced Navy parachute jumpers. These jumpers were standing "in line" in the cabin, waiting for the signal. They went out at two second intervals, and as a result the plane was cleared in 18 seconds. Assuming that the "first step" was taken by the air passenger, unless he has had the previous instruction, the chances against a safe descent appear to be against him. However, it is freely admitted that novices have successfully jumped from disabled planes and have made excellent landings.

Automatic Opening Parachute Discussed

Much thought has been given by those in Washington to the subject, which has resulted in the development of ideas pertaining to automatic-opening parachutes. As a means of getting all the passengers out, a device has been suggested whereby the cabin floor would fall out and the occupants of the plane would be thrown into the air. The advantage of this method of evacuating the plane would not only overcome refusals by some passengers to jump, but it would enable the pilot, on finding the circumstances such that he could not even inform those behind him of the imminent danger, to save all on board.

The Department of Commerce is watching with interest the experiments being conducted at Wright Field, Dayton, Ohio, by Maj. E. L. Hoffman, who was awarded the Collier Trophy two years ago for his work in developing the individual parachute. These experiments deal with the giant parachute which is intended to lower disabled planes safely to earth when a landing cannot be negotiated, or should a major structural failure occur. The outcome of these experiments in demonstrations made with various types of planes is being watched closely.

"Liberty Bell" Biplane

(*Continued from page* 810)

a ½ in. rubber cord wrapped in tension. All fittings for the landing gear are of chrome molybdenum steel. Streamlined wire wheels with 30x5 Goodyear rubber tires are employed and provision has been made to replace the landing gear with pontoons. The tail skid consists of a steel spring with shoe and is bolted to the fuselage and is non-steerable.

The wings are in four panels and attached to the fuselage in the usual manner. A modified Zimmerman 2a airfoil section is used. The wing structure consists of routed spruce I-beam spars and ribs of Warren truss construction with spruce capstrips. Four compression members are included in each panel. Two bays are made in the internal drag bracing of each panel and 8 guage wire

is used for this purpose. The leading edges are of spruce and the trailing edges are aluminum V strips. Wing tips are built of ½ in. steel tubing. All joints are glued and the internal structure shellaced. The panel structures are covered with Flightex fabric and finished with four coats of dope and one of pigment. Ailerons

Rear view of the Liberty Bell Biplane

are of similar construction and finish. All wing fittings are of chrome molybdenum steel and the weight of each panel is from 80 to 85 lb. The external bracing is conventional, employing interplane struts and wires.

The specifications as submitted by the manufacturer are as follows:

Length overall	22 ft. 10 in.
Height overall	9 ft. 6 in.
Airfoil section	Zimmerman 2a modified
Wing span (both wings)	30 ft. 10 in.
Chord	63.5 in.
Gap ratio	.9875
Stagger	.14 deg.
Total area of wings	312.7 sq. ft.
Area of ailerons	7.45 sq. ft.
Weight empty	1,335 lb.
Pay load	450 lb.
Disposable load (approximate)	1240 lb.
Gross weight	2575 lb.
Power plant Wright Hispano	180 h.p. at 1650 r.p.m.
Performance:	
High speed	135 m.p.h.
Cruising speed (2/3 throttle)	125 m.p.h.
Landing speed	40-45 m.p.h.
Time to climb 16,000 ft.	60 min.
Fuel capacity	70 gal.
Fuel consumption	9.5 gal. per hr.

The Curtis "Challenger"

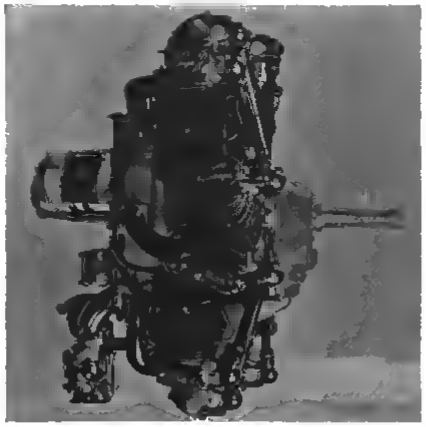
(*Continued from page* 809)

the lower left cylinder is led to this jacket. It passes into the jacket on the throttle section of the carburetor, around each barrel, and finally is carried to an exit opening, through a pipe, outside of the engine compartment. This exhaust heating of the carburetor and the use of the "hot-spot" elbow permits the operation of the engine in any kind of weather. A valve is fitted to the hot-spot elbow, so that the incoming exhaust gas can be controlled, depending upon the outside temperature. This equipment is included in the weight of the engine. By the use of this system, rather than attempting to control carburetion by cylinder heat, it is possible to obtain proper carburetion in any weather.

The Curtiss pressure and scavenging lubrication system is used. A pressure pump feeds oil to the rear main bearing, which is used as an oil seal, through a fine screen in a small pressure chamber. This screen is designed as a valve so that during cold weather, it will lift from its

seat, permitting oil to flow into the main bearings, if the oil is too thick to pass through the screen under these conditions. The oil feeds into the crankshaft, and the pressure is controlled at the opposite, or propeller end, by means of a by-pass valve located in the nose casting. This means of control insures positive pressure at every point in the crankshaft. The adjustment is very accessible.

Holes are drilled in the crankpins for feeding the connecting rods. The two link pins in each connecting rod are fed by positive pressure, through proper placed grooves in the connecting rod bearings. Oil is fed to the piston pins and cylinder walls by the oil which is thrown from the connecting rod bearings. The main bearings are



Side view of the six cylinder "Challenger" engine, showing the staggered cylinders

fed also in this same manner. The plain bearings for all the accessories drive gears are fed with oil, through drilled passages, from the rear main bearing. The cam mechanism bearings are fed under pressure from the front end of the crankshaft. The cams and cam followers are fed by splash.

The rocker arm bearings are fed by means of "Alemite" connections. The ball ends at each end of the rocker arms are fed, through holes drilled in the arms themselves, from this same source of supply. The return oil collects in a sump, which is attached to the bottom of the two crankcases and is built at such an angle that the oil will drain into the sum, even when the plane is in a gliding attitude. The pressure and scavenging screens, and the oil drain plug are located in this sump in a very accessible position. A single scavenging pump removes the oil from the engine through a screen, pumping it into the outside oil tank.

The engine is rated at 170 to 180 hp. at 1800 r.p.m. This propeller speed was selected, since it is the maximum that should be used in airplanes which have a top speed of 120 mi. per hr. The fuel consumption is normal, and the oil consumption is low, which is a characteristic of all Curtiss engines.

The actual design work on this engine was started in May, 1927. The first engine was running on the last day of December, 1927. Since that time it has been subjected to rigid endurance tests, having been run approximately

230 hr., of which 125 hr. were at propeller speeds above 1700 r.p.m., and 40 hr. more at full throttle at 1800 r.p.m. This same engine is still undergoing further endurance tests, and is in excellent condition.

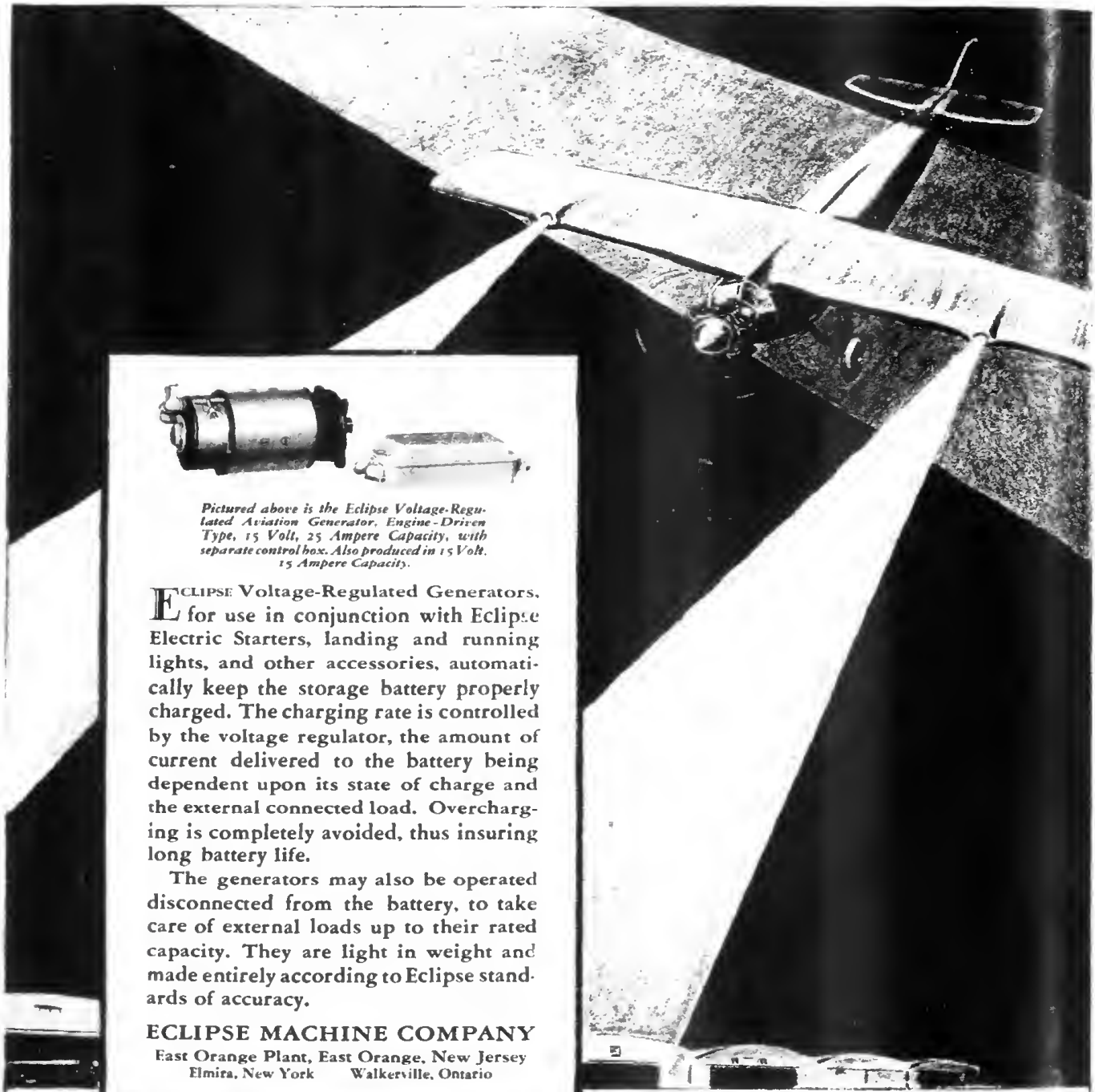
During flight tests of this engine in the Curtiss "Robin" airplane, the smooth operating characteristics were noticeable. The type of induction system gives very remarkable acceleration from the idling speed of 150 to 200 r.p.m. to full throttle which is very desirable. The engine operates smoothly through its entire range. As an example of its endurance qualities, the valves in the first engine have not been reground since the engine was first started running on December 31, 1927, and all of the valves still hold gasoline when tested.

Rear view of the Curtiss "Challenger," illustrating the mounting of the Stromberg carburetor and the two Scintilla magnetos

The Curtiss Challenger engine was designed to give the maximum in quality and the best possible service, at the same time keeping the cost low by proper manufacture with modern equipment. As a results its design, the engine requires a minimum number of machining operations in the process manufacture. It has as few parts as possible. The engine has passed an official Government 50 hr. endurance test, and will be in quantity production in the fall. It is expected that the engine will sell at a lower price per hp. than the average engine.

The specifications of the engine are as follows:

Model	R-600
Hp. (Rated at 1800 r.p.m.)	170
Type of Engine	Static Aircooled Radial
No. of cylinders	6
Arrangement of Cylinders	2 radial row of 3 each
Bore	5⅛ in.
Stroke	4⅞ in.
Diameter of engine	42⅝ in.
Displacement	603 cu. in.
Ignition System	2 Scintilla Magnetos
Carbureter	Stromberg NA-U4J
Fuel Consumption Cruising	50 lb. per brake hp. hr.
Oil Consumption	015 lb. per brake hp. hr.
Speed of Propeller	Crankshaft
Rotation of Propeller	Clockwise
Weight of engine	420 lb.



Pictured above is the Eclipse Voltage-Regulated Aviation Generator, Engine-Driven Type, 15 Volt, 25 Ampere Capacity, with separate control box. Also produced in 15 Volt, 15 Ampere Capacity.

ECLIPSE Voltage-Regulated Generators, for use in conjunction with Eclipse Electric Starters, landing and running lights, and other accessories, automatically keep the storage battery properly charged. The charging rate is controlled by the voltage regulator, the amount of current delivered to the battery being dependent upon its state of charge and the external connected load. Overcharging is completely avoided, thus insuring long battery life.

The generators may also be operated disconnected from the battery, to take care of external loads up to their rated capacity. They are light in weight and made entirely according to Eclipse standards of accuracy.

ECLIPSE MACHINE COMPANY

East Orange Plant, East Orange, New Jersey
Elmira, New York Walkerville, Ontario

ECLIPSE

AVIATION STARTERS AND GENERATORS